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Ministry of Health Malaysia
Pharmaceutical Services Programme

DILUTION GUIDE FOR FLUID RESTRICTED CRITICALLY ILL ADULTS

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Limitation of Liability:
While every effort was made to ensure the accuracy and relevance of the information contained in this guideline, the committee assume no liability for inaccuracies or misstatements in this document. Please use the guideline judiciously, and only apply the minimum volumes where the clinical situation makes it necessary. It is important to note that the information on suggested minimum dilution for each drug may differ from one facility to another, depending on the brand of the drug used in a particular facility.

FOREWORD

Madam Wan Noraimi binti Wan Ibrahim
Director of Pharmacy Practice and Development Division
Ministry of Health Malaysia

Critical care is a highly specialized and dynamic field that requires close monitoring, timely interventions, and a coordinated effort among healthcare providers to optimize patient outcomes. The care of critically ill patients requires a coordinated and multidisciplinary approach, involving intensivists, nurses, pharmacists, and other healthcare professionals.

Critical care pharmacy services are essential to ensure the safe and effective use of medications in critically ill patients. Critical care pharmacists contribute to various aspects of patient care, from medication management to collaboration with the multidisciplinary team and involvement in research and education.

Fluid restriction is one of the interventions implemented in critical care setting to manage conditions that can be exacerbated by excessive fluid such as renal dysfunction and electrolyte imbalances.

The recommended dilution for certain medications may not be applicable to patients with fluid restriction. Thus, this guideline is developed to provide essential information to Critical Care Pharmacists in ensuring critically ill patients receive safe and effective medications.

We hope this guideline serves as a valuable reference for pharmacists managing critically ill patients.

PREFACE

Critically ill patients are individuals with severe and often life-threatening medical conditions that require round-the-clock monitoring and care by a specialized team of healthcare professionals. The treatment of critically ill patients involves a combination of advanced medical technology, medications, and expert medical care aimed in stabilizing their condition and facilitate the recovery process.

Pharmacotherapy in critically ill patients often requires many special considerations. One of the most common and important consideration in critically ill patients is **fluid restriction**. It is of utmost importance for healthcare providers to carefully monitor fluid requirements and fluid intake which should be tailored to each patient's unique needs to avoid any unnecessary complications. Hence, it is often a challenge for Critical Care Pharmacists to recommend the most judicious volume for drug dilution prior to its administration.

The aim of this guideline is to provide practical guide for pharmacists in managing patients with fluid restriction where normal recommendation for certain drug dilution may not be feasible.

The working committee hopes that this document will be a useful guide for Critical Care Pharmacists as well as other healthcare professionals involved in the management of patients in this area.

ADVISORS

WAN NORAIMI BINTI WAN IBRAHIM
Director of Pharmacy Practice and Development Division
Pharmaceutical Services Programme
Ministry Of Health Malaysia

SYAHIDA BINTI CHE EMBI
Deputy Director of Pharmacy Practice and Development Division
Pharmaceutical Services Programme
Ministry Of Health Malaysia

EDITORS & CONTRIBUTORS

CLINICAL PHARMACY WORKING COMMITTEE (CRITICAL CARE SUBSPECIALTY)

Alia Hayati binti Baharudin
Hospital Tuanku Fauziah

Andrew Yem Weng Hoong
Hospital Kuala Lumpur

Charlene Tay Szu Lynn
Hospital Kuala Lumpur

Chong Lai Peng
Hospital Melaka

Faridah Yusof
Hospital Sultanah Bahiyah

Ignatius Leon Guang Woei
Hospital Selayang

Jerry Liew Ee Siung
Hospital Queen Elizabeth

Lee Yee Lin
Hospital Tengku Ampuan Afzan

Lim Shiao Hui
Hospital Pulau Pinang

Mardhiyah binti Kamal
Pharmacy Practice & Development Division

Nicole Foo Yen Fei
Hospital Umum Sarawak

Nurul Akma binti Hanan
Hospital Tuanku Ja'afar

Nurul Hidayah binti Awang
Pharmacy Practice & Development Division

Dr. Rahela Ambaras Khan
Hospital Kuala Lumpur

Ros Sakinah binti Kamaludin
Hospital Raja Permaisuri Bainun

Roslita binti Alivi
Hospital Sultanah Aminah

Siti Amira Syarina binti Mohd Kasim
Hospital Putrajaya

Siti Nur Aziela Binti Ab Manap
Hospital Raja Perempuan Zainab II

Siti Nuraidah binti Mamat
Hospital Sultanah Nur Zahirah

Tan Guo Hong
Hospital Sultanah Bahiyah

EXTERNAL REVIEWERS

DR. MUHAMMAD ZIHNI BIN ABDULLAH
Consultant Intensivist
Hospital Tengku Ampuan Afzan

DR. NORYANI BINTI MOHD SAMAT
Consultant Intensivist
Hospital Sultan Ismail Petra

MR. TAN CHEE CHIN
Pharmacist
Hospital Sultan Ismail

CONTENT

ABBREVIATIONS

bpm	Beats per minute
D5	5% dextrose and water
g	Gram
HCl	Hydrochloride
IM	Intramuscular
IT	Intrathecal
IU	International unit
IV	Intravenous
kg	Kilogram
mcg	Microgram
mg	Milligram
min	Minute
ml	Milliliter
mmol	Millimol
MU	Million units
NS	Normal saline
RT	Room temperature
SC	Subcutaneous
VF	Ventricular fibrillation
VT	Ventricular tachycardia
w/v	Weight over volume
WFI	Water for injection

ACETYLCYSTEINE 5 G/25 ML

<table>
<tr><td>Brand name</td><td>Hidonac</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Central: No further dilution required
Peripheral: 150 mg/kg in 200 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>I. IV infusion (Paracetamol poisoning – 3 bags regime, 21 hours):
150 mg/kg in 200 ml over 15 minutes, followed by
50 mg/kg in 500 ml over 4 hours, then
100 mg/kg in 1000 ml over 16 hours

II. IV infusion (Paracetamol poisoning – 2 bags regime, 20 hours):
200mg/kg in 250 ml over 4 hours
100mg/kg in 500 ml over 16 hours

III. IV infusion (Acute hepatic failure, non-paracetamol induced) [off-label dosage]:
150 mg/kg/hr for 1 hour, followed by
12.5 mg/kg/hr for 4 hours, then
6.25 mg/kg/hr for 67 hours

IV. IV infusion (Prophylaxis for radiographic contrast nephropathy) [off-label dosage]:
Dilute 600 – 1200 mg in 50 – 100 ml, infuse over 30 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>

1. Alfasigma S.p.A. N-Acetylcysteine (Hidonac) Product Leaflet. Revised 18 Jan 2016.
2. Chiew AL et al. Summary statement: new guidelines for the management of paracetamol poisoning in Australia and New Zealand. Med J Aust. 2015 Sep 7;203(5):215-8. doi: 10.5694/mja15.00614
3. Lee WM, Hynan LS, Rossaro L, et al. Intravenous N-acetylcysteine improves transplant-free survival in early stage non-acetaminophen acute liver failure. Gastroenterology. 2009;137:856–864.e1.
4. Sun Z, Fu Q, Cao L, Jin W, Cheng LL, Li Z. Intravenous N-acetylcysteine for prevention of contrast-induced nephropathy: A meta-analysis of randomized, controlled trials. PLoS ONE. 2013;8(1).
5. Truven Health Analytics. Micromedex.
6. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
7. Wong A et al. Efficacy of two bag acetylcysteine regimen to treat paracetamol overdose (2NAC study). Lancet. 2020; 20

</td></tr>
</table>

ACYCLOVIR 250 MG

<table>
<tr><td>Brand name</td><td>Vaxcel Acyclovir</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute 1 vial with 10 ml WFI or NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 5 mg/ml (250 mg in 50 ml)</td></tr>
<tr><td>Diluent</td><td>HS, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over at least 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>48 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Higher concentration (>10mg/ml) may produce phlebitis or inflammation at the injection site.</td></tr>
<tr><td>References</td><td>1. Kotra Pharma. Vaxcel Acyclovir 250mg Product Leaflet. Revised 2 April 2019.
2. Truven Health Analytics. Micromedex.
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

ADENOSINE 6 MG/2 ML

<table>
<tr><td>Brand name</td><td>Adenorythm</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 2 seconds</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administer through a peripheral vein (using large bore cannula) only. Do not administer through central line (may cause prolonged asystole).
▪ If given into an IV line, it should be injected as proximally as possible, and followed by a rapid saline flush.</td></tr>
<tr><td>References</td><td>1. Truven Health Analytics. Micromedex.
2. Vanex S. A. Adenorythm Solution for Injection 3 mg/ml Product Leaflet. Revised March 2016.</td></tr>
</table>

ADRENALINE 1 MG/1 ML

<table>
<tr><td>Brand name</td><td>CCM Adrenaline</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td><u>IM, SC, IV bolus</u>
No further dilution required

<u>IV infusion</u>
Peripheral: Maximum concentration of 0.06 mg/ml (3 mg/50 ml)
Central: Maximum concentration of 0.12 mg/ml (6 mg/50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM, SC
IV bolus: Administer over at least 1 minute
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr></table></td></tr>
<tr><td>Comments</td><td>▪ Administration via central line is recommended.
▪ If administered peripherally (<24 hours), monitor IV site for blanching and extravasation.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Adrenaline (CCM Adrenaline) Product Leaflet. Revised 8 July 2011.
2. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
3. Truven Health Analytics. Micromedex.
4. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

ALTEPLASE 50 MG

<table>
<tr><td>Brand name</td><td>Actilyse</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 50 ml sterilized water (provided in package)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>I. Myocardial infarction:
Accelerated infusion (total 90 minutes) or 3 hours infusion regimen. Refer to institution protocol

II. Acute ischemic stroke:
0.9 mg/kg (not to exceed 90 mg total dose) infused over 60 minutes with 10% of the total dose administered as an initial intravenous bolus over 1 minute

III. Pulmonary embolism:
IV infusion over 2 hours</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Reconstitution</td><td>24 hours</td><td>8 hours</td></tr></table></td></tr>
<tr><td>Comments</td><td>▪ The reconstituted solution may be further diluted with NS up to a minimal concentration of 0.2 mg/ml.</td></tr>
<tr><td>References</td><td>1. Boehringer Ingelheim Pharma GmbH & Co. Actilyse® Product Leaflet. Revised 28 March 2020.</td></tr>
</table>

AMIKACIN 500 MG/2 ML

<table>
<tr><td>Brand name</td><td>Apalin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Required dose to be diluted up to 50 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>60 days</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Usual dilution 500 mg in 100 – 200 ml of diluent (Concentration of 2.5 – 5 mg/ml).</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Apalin Product Leaflet. Revised 12 April 2019.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

AMINOPHYLLINE 250 MG/10 ML

<table>
<tr><td>Brand name</td><td>Aminophyllin IV Fresenius</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 1 – 2 mg/ml
Central: No further dilution required</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td><u>IV infusion</u>
Loading dose: Infuse over 20 – 30 minutes
Maintenance dose: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>

1. Fresenius Kabi. Aminophylline IV Fresenius Product Leaflet. Revised February 2017.
2. McAuley D. [Internet]. Aminophylline Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/aminophylline/
3. Riaz M, Ami KH. Stability of aminophylline. Pakistan journal of pharmaceutical sciences. 1993 Jan;6(1):35–44.
4. Schull PD. McGraw-Hill's I.V. Drug Handbook. New York: McGraw-Hill Medical; 2009.
5. Truven Health Analytics. Micromedex.
6. Uptodate. Aminophylline Drug Information. Wolters Kluwer.
7. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.

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</table>

AMIODARONE HYDROCHLORIDE 150 MG/3 ML

<table>
<tr><td>Brand name</td><td>Amiodarone HCL</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td><u>IV bolus</u>
Peripheral: Dilute to a maximum concentration of 2 mg/ml (150 mg in 75 ml)
Central: Dilute to a maximum concentration of 6 mg/ml (150 mg in 25 ml)

<u>IV infusion</u>
Peripheral: Dilute to a maximum concentration of 2 mg/ml (900 mg in 500 ml)
Central: Dilute to a maximum concentration of 18 mg/ml (900 mg in 50 ml)</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td><u>Loading dose</u>
IV bolus (pulseless VT/VF): Administer rapidly
IV infusion: Infuse 150 mg over 10 minutes

<u>Maintenance dose</u>
IV infusion: Infuse 360 mg over 6 hours (1 mg/min) followed by 540 mg over 18 hours (0.5 mg/min) (total 900 mg over 24 hours). Infusion rate of 0.5 mg/min can be given if maintenance dose exceeds 24 hours.</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Dilution</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>Comments</td><td>▪ Concentrations less than 0.6 mg/ml are unstable.</td></tr>
<tr><td>References</td><td>1. Bioindustria L.I.M. Amiodarone HCL 150mg/3ml Injection Product Leaflet. Revised November 2016.
2. Gahart BL, Nazareno AR. 2011 intravenous medications: A handbook for Nurses and Health Professionals. 27th ed. St. Louis, MO: Elsevier Mosby; 2010.
3. Trissel LA. Handbook on Injectable Drugs. 13th ed. Bethesda, MD: American Society of Health-System Pharmacists; 2005.
4. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

AMOXYCILLIN/CLAVULANATE 1.2 G (AMOXICILLIN 1000 MG & POTASSIUM CLAVULANATE 200 MG)

<table>
<tr><td>Brand name</td><td>Clavicin</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute 1.2 g in 20 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Not further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 4 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>-</td><td>4 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Mylan. Clavicin Product Leaflet. Revised October 2016.</td></tr>
</table>

AMPHOTERICIN B SODIUM DEOXYCHOLATE 50 MG

<table>
<tr><td>Brand name</td><td>Amphotret</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 0.2 mg/ml (50 mg in 250 ml)
Central: Maximum concentration of 0.5 mg/ml (50 mg in 100 ml)</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 4 – 6 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ To minimize infusion related immediate reactions; premedicate with the following 30 – 60 minutes prior to administration: paracetamol, diphenhydramine and/or hydrocortisone.
▪ A test dose of 1 mg in 20 ml D5, infuse over 20 – 30 minutes may be considered.
▪ Rapid infusion may cause hypotension, hypokalemia, arrhythmia, and shock. Infusion related reactions can occur with all amphotericin B formulations.
▪ Protect from light during administration.</td></tr>
<tr><td>References</td><td>1. Bharat Serums and Vaccines Ltd. Amphotret® 50mg product leaflet.
2. Gahart BL, Nazareno AR. 2011 intravenous medications: A handbook for Nurses and Health Professionals. 27th ed. St. Louis, MO: Elsevier Mosby; 2010.
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

AMPHOTERICIN B LIPID COMPLEX 50 MG/10 ML

<table>
<tr><td>Brand name</td><td>Ampholip</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 2 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse at a rate of 2.5 mg/kg/hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>48 hours</td><td>6 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Flush existing intravenous line with D5 before and after infusion.
▪ If the infusion time exceeds 2 hours, mix the contents by shaking the infusion bag every 2 hours.</td></tr>
<tr><td>References</td><td>1. Bharat Serums and Vaccines Ltd. Ampholip Injection Product Leaflet. Revised 22 July 2020.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

AMPICILLIN 500 MG

<table>
<tr><td>Brand name</td><td>Kampibiotic</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus (<1 g): Administer over 3 – 4 minutes
IV infusion (≥1 g): Infuse over 10 – 15 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Rapid infusion may cause seizures.</td></tr>
<tr><td>References</td><td>1. Gahart BL, Nazareno AR. 2011 intravenous medications: A handbook for Nurses and Health Professionals. 27th ed. St. Louis, MO: Elsevier Mosby; 2010.
2. Karnataka Antibiotics & Pharmaceuticals Ltd. Kampibiotic 500 Injection Product Leaflet. Revised 25 July 2017.</td></tr>
</table>

AMPICILLIN/SULBACTAM 1.5 G INJECTION (AMPICILLIN 1000 MG & SULBACTAM 500 MG)

<table>
<tr><td>Brand name</td><td>Amsubac</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 3.2 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 45 mg/ml (9 g in 200 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 minutes
IV infusion: Infuse over 15 – 30 minutes or as extended over 4 hours (Dose>3 g)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>48 hours</td><td>8 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Karnataka Antibiotics & Pharmaceuticals Ltd. Amsubac 1.5g Injection Product Leaflet. Revised 23 January 2018.</td></tr>
</table>

ANIDULAFUNGIN 100 MG

<table>
<tr><td>Brand name</td><td>Eraxis</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 30 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 0.77 mg/ml (100 mg in 130 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse 100 mg over 90 minutes or 200 mg over 180 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>48 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Infusion rate > 1.1 mg/min may cause histamine mediated reactions (i.e. dyspnea, flushing, hypotension, pruritus, rash, urticaria).</td></tr>
<tr><td>References</td><td>
1. Gahart BL, Nazareno AR. 2011 intravenous medications: A handbook for Nurses and Health Professionals. 27th ed. St. Louis, MO: Elsevier Mosby; 2010.
2. Pharmacia and Upjohn Company LLC. Eraxis Product Leaflet (Revised 11 August 2020).
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

ARTESUNATE 60 MG

<table>
<tr><td>Brand name</td><td>Artesun</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 5% sodium bicarbonate solution (provided)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 10 mg/ml (60 mg in 6 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 1 – 2 minutes (3 – 4 ml/min)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>1 hour</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Guilin Pharmaceutical Co. Ltd. Artesunate Powder for Injection 60 mg Product Leaflet.
2. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
3. Truven Health Analytics. Micromedex.</td></tr>
</table>

ATRACURIUM BESYLATE 25 MG/2.5 ML & 50 MG/5 ML

<table>
<tr><td>Brand name</td><td>Atracurium Kalceks</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer undiluted
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ May be further diluted to concentration of 0.5 – 5 mg/ml with D5 or NS.</td></tr>
<tr><td>References</td><td>1. HBM Pharma S.R.O. Atracurium Kalceks 10 mg/ml Solution for Injection/Infusion Product Leaflet. Revised May 2020.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

ATROPINE 1 MG/1 ML

<table>
<tr><td>Brand name</td><td>Atropine Sulphate</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM: Administer to the outer thigh
SC
IV bolus: Administer undiluted
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Hua-Huat S, Lee-Gong L, Peng-Hong C, Hu M. Sarawak Handbook of Medical Emergencies. Sarawak: C.E. Publishing; 2011.
2. Pharmaniaga. Atropine Sulphate 1mg/ml Injection Product Leaflet. Revised 27 December 2017.</td></tr>
</table>

AZITHROMYCIN 500 MG

<table>
<tr><td>Brand name</td><td>Vaxcel Azithromycin</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute 500 mg vial with 4.8 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 2 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>7 days</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Kotra Pharma. Vaxcel Azithromycin 500 mg IV for Infusion Product Leaflet. Revised 27 April 2017.</td></tr>
</table>

BENZYLPENICILLIN SODIUM 1 MU (600 MG) & 5 MU (3 G)

<table>
<tr><td>Brand name</td><td>Bepen Injection</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute 1 MU with 2 ml WFI
Reconstitute 5 MU with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 60mg/ml (1 MU in 10ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Gahart BL, Nazareno AR. 2011 intravenous medications: A handbook for Nurses and Health Professionals. 27th ed. St. Louis, MO: Elsevier Mosby; 2010.
2. Karnataka Antibiotics & Pharmaceuticals Ltd. Bepen Injection Product Leaflet. Revised 14 February 2017.
</td></tr>
</table>

BROMHEXINE HYDROCHLORIDE 4 MG/2 ML

<table>
<tr><td>Brand name</td><td>Mucolex</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 2 – 3 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Mucolex Injection Product Leaflet. Revised 8 Dec 2020.</td></tr>
</table>

CALCITONIN (SYNTHETIC SALMON CALCITONIN) 50 IU/1 ML & 100 IU/1 ML

<table>
<tr><td>Brand name</td><td>Miacalcic</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IM, SC: No further dilution required
IV infusion: 5 – 10 IU/kg in 500 ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IM: If exceed 2 ml for IM injection, prefer administration at varying sites
SC
IV Infusion: Infuse over at least 6 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. SolupharmPharmazeutischeErzeugnisse GmbH. Miacalcic® Ampoules Product Leaflet. Revised Nov 2017.</td></tr>
</table>

CALCIUM GLUCONATE 10% 10 ML (CONTAINS 1 G CALCIUM, EQUIVALENT TO 2.25 MMOL CALCIUM)

<table>
<tr><td>Brand name</td><td>Calcium Gluconate 10% B.Braun</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus/infusion/continuous infusion: Maximum concentration of 50 mg/ml (1 g in 20 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus (cardiac arrest/hyperkalemia): Not exceeding 200 mg/min
IV infusion (hypocalcemia): Not exceeding 50 mg/min
Continuous infusion (beta-blocker and calcium channel blocker toxicity): Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Dilution</td><td>24 hours</td><td>Use immediately</td></tr></table></td></tr>
<tr><td>Comments</td><td>▪ For patients in cardiac arrest, administer as a rapid bolus via a central line.</td></tr>
<tr><td>References</td><td>1. B. Braun. Calcium Gluconate 10% Product Leaflet.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

CASPOFUNGIN 50 MG & 70 MG

<table>
<tr><td>Brand name</td><td>Cancidas</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10.5 ml NS or WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>70 mg (loading dose): Further dilute in 200 ml
50 mg (maintenance dose): Further dilute in 100 ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>48 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Dilution of 70 mg in single 100 ml IV bag not recommended</td></tr>
<tr><td>References</td><td>
1. Merck Sharp & Dohme (M). Cancidas Product Leaflet.
2. MIMS Online. Cancidas [Internet]. MIMS. [cited 2022]. Available from: https://www.mims.com/
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

CEFAZOLIN 1 G

<table>
<tr><td>Brand name</td><td>Cefazolin Sandoz</td></tr>
<tr><td>Reconstitution</td><td>IM: Reconstitute with 4 ml 0.5% lidocaine
IV bolus, IV infusion: Reconstitute with 4 ml NS or WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IM: No further dilution required
IV bolus, IV infusion: Maximum concentration of 20 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM: Inject deep IM into large muscle mass
IV bolus: Administer over 3 – 5 minutes
IV infusion (for doses >1 g): Infuse over 30 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Sandoz GmbH. Cefazolin Sandoz Product Leaftlet.</td></tr>
</table>

CEFEPIME 1 G

<table>
<tr><td>Brand name</td><td>Vaxcel Cefepime</td></tr>
<tr><td>Reconstitution</td><td>IM: Reconstitute with 3 ml diluent
IV bolus, IV infusion: Reconstitute with 10 ml diluent</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IM, IV bolus: No further dilution required
IV infusion: Maximum concentration of 40 mg/ml (1 g in 25 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM: Inject deep IM into large muscle mass
IV bolus: Administer over 3 - 5 minutes
IV infusion: Infuse over 30 minutes or as extended up to 4 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>7 days</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Kotra Pharma. Vaxcel Cefepime Product Leaflet.</td></tr>
</table>

CEFOPERAZONE 1 G & 2 G

<table>
<tr><td>Brand name</td><td>Bicafar</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 5 ml of D5 or NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 100 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 15 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Cefoperazone is incompatible with aminoglycosides, perphenazine or pethidine hydrochloride.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Bicafar Cefoperazone Product Leaflet.</td></tr>
</table>

CEFOPERAZONE/SULBACTAM 1 G

<table>
<tr><td>Brand name</td><td>Vaxcel Cefobactam</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 3.4 ml diluent</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Further dilute in 20 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 15 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ No maximum concentration data available.
▪ Should not be directly mixed with aminoglycoside due to physical incompatibility.</td></tr>
<tr><td>References</td><td>1. Kotra Pharma. Vaxcel Cefobactam Product Leaflet.</td></tr>
</table>

CEFOTAXIME 500 MG & 1 G

<table>
<tr><td>Brand name</td><td>Rekaxime</td></tr>
<tr><td>Reconstitution</td><td>IM, IV: Reconstitute each 1 g with 4 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: Further dilute 1 – 2 g in 10 ml
IV infusion: Further dilute 1 – 2 g in 40 – 100 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 20 minutes (short) or 60 minutes (continuous drip)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Sodium bicarbonate must not be mixed with cefotaxime.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Rekaxime Cefotaxime Product Leaflet.</td></tr>
</table>

CEFTAZIDIME 1 G & 2 G

<table>
<tr><td>Brand name</td><td>Cefatum</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 40 mg/ml (1 g in 25 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 30 minutes or as extended over 4 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>7 days</td><td>12 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Cefatum Ceftazidime Product Leaflet.
2. Pharmaceutical Services Division. Antibiotic Dilution Protocol. Penang State Health Department; 2016.</td></tr>
</table>

CEFTRIAXONE 500 MG & 1 G

<table>
<tr><td>Brand name</td><td>Unocef</td></tr>
<tr><td>Reconstitution</td><td>IM: Reconstitute each 1 g with 3.6 ml D5 or NS
IV infusion: Reconstitute each 1 g with 9.6 ml D5 or NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IM: No further dilution required
IV: Maximum concentration of 40 mg/ml (1 g in 25 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution (IM)</td><td>3 days</td><td>24 hours</td></tr>
<tr><td>After Dilution (IV)</td><td>10 days</td><td>3 days</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Do not use diluents containing calcium, such as Ringer’s solution or Hartmann’s solution, to reconstitute ceftriaxone.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Unocef Ceftriaxone Product Leaflet.</td></tr>
</table>

CEFUROXIME 750 MG & 1.5 G

<table>
<tr><td>Brand name</td><td>Anikef</td></tr>
<tr><td>Reconstitution</td><td>750 mg: Reconstitute with 6 ml WFI
1.5 g: Reconstitute with 15 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Further dilute in 50 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>7 days</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Incompatible with aminoglycosides.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Anikef Cefuroxime Product Leaflet.</td></tr>
</table>

CHLORPHENIRAMINE 10 MG/1 ML

<table>
<tr><td>Brand name</td><td>Imach</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM, SC
IV bolus: Administer over 1 minute</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Gray AH. Injectable Drugs Guide. London: Pharmaceutical Press; 2011.
2. SM Pharmaceuticals Sdn. Bhd. Imach Chloramphenicol Maleate Injection Product Leaflet.</td></tr>
</table>

CIPROFLOXACIN 200 MG/100 ML

<table>
<tr><td>Brand name</td><td>Ciproxol</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administer into a large vein to reduce risk of vein irritation. Slow infusion can minimize risk of venous irritation.</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn. Bhd. Ciproxol (Ciprofloxacin 0.2% w/v Intravenous Infusion BP) Product Leaflet. Revised 25 September 2018.</td></tr>
</table>

CISATRACURIUM 2 MG/1 ML

<table>
<tr><td>Brand name</td><td>Nimbex</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 5 – 10 seconds
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Cisatracurium is stable only in acidic solution. It is not compatible with alkaline solutions with pH > 8.5.
▪ It is not compatible with ketorolac or propofol injectable emulsion.</td></tr>
<tr><td>References</td><td>1. Aspen SA Sterile Operations (Pty) Ltd. Nimbex (Intravenous Injection Cisatracurium besylate) Product Leaflet. Revised 15 May 2022.
2. McAuley D. [Internet]. Nimbex-Cisatracurium. GlobalRPh;2017 [cited 1 Sept 2022]. Available from: https://globalrph.com/drugs/neuromuscular-blocking-agents/#cisatracurium-nimbex.</td></tr>
</table>

CLINDAMYCIN 300 MG/2 ML

<table>
<tr><td>Brand name</td><td>YSP Tidact</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 18 mg/ml (900 mg in 50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 10 – 60 minutes (not exceeding 30 mg/min)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Y.S.P. Industries (M). YSP Tidact 150 mg/ml Solution for Injection Product Leaflet. Revised 27 April 2019.</td></tr>
</table>

CLOXACILLIN 500 MG

<table>
<tr><td>Brand name</td><td>Cloxabiotic</td></tr>
<tr><td>Reconstitution</td><td>IV: Reconstitute with 4.8 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Further dilute to a maximum concentration of 50 mg/ml</td></tr>
<tr><td>Diluent</td><td>NS, D5</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 10 minutes
IV infusion: Infuse over at least 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Extending infusion over 60 minutes has been used for peripheral administration to decrease risk of phlebitis.</td></tr>
<tr><td>References</td><td>
1. Karnataka Antibiotics & Pharmaceuticals Ltd. Cloxabiotic Injection Product Leaflet. Revised 12 February 2018.
2. Loeuille G, D'Huart E, Vigneron J et al. Stability Studies of 16 Antibiotics for Continuous Infusion in Intensive Care Units and for Performing Outpatient Parenteral Antimicrobial Therapy. Antibiotics (Basel). 2022;11(4):458.
3. MSF Medical Guidelines. [cited 31 Aug 2022]. Available from: https://medicalguidelines.msf.org/en
</td></tr>
</table>

COLISTIMETHATE (POLYMYXIN E) 1 MILLION UNITS (MU)

<table>
<tr><td>Brand name</td><td>Xelcol</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute 1 MU with not more than 10 ml WFI or NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 1 MU/5 ml (2 MU in 10 – 50ml)</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 minutes – 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
2. Xellia Pharmaceuticals ApS. Xelcol Product Leaflet. Revised 12 Oct 2020.</td></tr>
</table>

CO-TRIMOXAZOLE (SULFAMETHOXAZOLE 400 MG & TRIMETHOPRIM 80 MG)

<table>
<tr><td>Brand name</td><td>Bactrim</td></tr>
<tr><td>Reconstitution</td><td>Not Required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 1 ampoule (480 mg) in 75 ml</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over at least 90 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>2 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Deva Holding A.S. Product Leaftlet Bactrim Inj 400 mg/80 mg.
2. NHS. Critical Care Intravenous Drug Administration Guide. 2008.
3. NHS. Pharmacy Drug Guideline Folder. 2017.</td></tr>
</table>

CYANOCOBALAMIN 1000 MCG/1 ML

<table>
<tr><td>Brand name</td><td>Cyanocobalamin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM, Deep SC</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Do not administer IV as it will result in most of the drug excreted rapidly into the urine.</td></tr>
<tr><td>References</td><td>1. Mylan Pharmaceuticals ULC. Cyanocobalamin Injection USP 1000 mcg/ml Product Leaflet. Revised 23 May 2014.
2. Pharmaniaga. Cyanocobalamin 1000 mcg/ml Injection Product Leaflet. Revised 6 Dec 2017.</td></tr>
</table>

DANTROLENE 20 MG

<table>
<tr><td>Brand name</td><td>Dantrium</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 60 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer as rapid push
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Stability of reconstituted solution: 6 hours at 15°C to 30°C.
▪ Protect from light.</td></tr>
<tr><td>References</td><td>1. Par Pharmaceutical, Inc. Dantrium Product Leaflet. Revised 23 Apr 2018.</td></tr>
</table>

DAPTOMYCIN 500 MG

<table>
<tr><td>Brand name</td><td>Cubicin</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV infusion: Further dilute required dose in 50 ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ To minimize foaming, avoid vigorous agitation or shaking of the vial during or after reconstitution.
▪ Stability after reconstitution: 12 hours at room temperature, 48 hours at 2 – 8°C.</td></tr>
<tr><td>References</td><td>1. Patheon Italia S.P.A. Cubicin Product Leaflet. Revised Feb 2021.</td></tr>
</table>

DESMOPRESSIN 4 MCG/1 ML

<table>
<tr><td>Brand name</td><td>Minirin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td><u>SC</u>
Undiluted

<u>IV</u>
Central diabetes insipidus: Undiluted
Haemophilia, von Willebrand’s Disease, & uremic bleeding: Further dilute required dose in 50 ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>SC
IV bolus (Central diabetes insipidus): Administer as IV push
IV infusion (Haemophilia, von Willebrand’s Disease, & uremic bleeding): Infuse over 15 – 30 minutes</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Dilution</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Ferring Pharmaceuticals. Minirin Product Leaftlet. Revised 1 May 2015.
2. McAuley D. [Internet]. Desmopressin (DDVAP) Dilution. GlobalRPh;2017. Available from: https://globalrph.com/dilution/desmopressin-ddavp/
3. UpToDate. Desmopressin Drug Information. Wolters Kluwer.</td></tr>
</table>

DEXAMETHASONE 8 MG/2 ML

<table>
<tr><td>Brand name</td><td>Penatone</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM, SC
IV bolus/infusion: Administer over 5 – 15 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ In shock and idiopathic thrombocytopenic purpura, use only the IV route.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Penatone Product Leaflet. Revised 11 Jul 2018.</td></tr>
</table>

DEXMEDETOMIDINE 200 MCG/2 ML

<table>
<tr><td>Brand name</td><td>Precedex</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 4 mcg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Loading dose over 10 minutes followed by dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Loading dose may be extended over 20 minutes to further reduce vasoconstrictive effects.</td></tr>
<tr><td>References</td><td>
1. Hospira Inc. Precedex Product Leaflet. Revised 4 Oct 2018.
2. McAuley D. [Internet]. Precedex-Dexmedetomidine Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/precedex-dexmedetomidine/
</td></tr>
</table>

DIAZEPAM 10 MG/2 ML

<table>
<tr><td>Brand name</td><td>Zopam</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer not exceeding 5 mg/min</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Rapid injection may cause respiratory depression or hypotension.</td></tr>
<tr><td>References</td><td>1. SM Pharmaceuticals Sdn Bhd. Zopam Product Leaflet. Revised 23 Apr 2021.
2. UpToDate. Diazepam Drug Information. Wolters Kluwer.</td></tr>
</table>

DIGOXIN 0.5 MG/2 ML

<table>
<tr><td>Brand name</td><td>Assos</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required. However, minimum of 4-fold dilution with D5 or NS is preferred (2 ml digoxin with 8 ml diluent)</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over at least 5 minutes
IV infusion: Infuse over 15 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ The use of less than a 4-fold volume of diluent could lead to precipitation of digoxin.</td></tr>
<tr><td>References</td><td>1. McAuley D. [Internet]. Digoxin Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/digoxin-immune-fab/
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
3. UpToDate. Digoxin Drug Information. Wolters Kluwer.</td></tr>
</table>

DOBUTAMINE 250 MG/20 ML

<table>
<tr><td>Brand name</td><td>Mobitil</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 5 mg/ml (250 mg/50 ml)
Central: Maximum concentration of 10 mg/ml (500 mg/50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administration via central line is recommended.</td></tr>
<tr><td>References</td><td>
1. Duopharma (M) Sdn. Bhd. Mobitil Product Leaflet. Revised 9 Jul 2019.
2. McAuley D. [Internet]. Dobutamine Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/dobutamine-hydrochloride/
3. NHS. Critical Care Intravenous Drug Administration Guide. 2008.
4. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

DOPAMINE 200 MG/5 ML

<table>
<tr><td>Brand name</td><td>Loxin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 0.8 mg/ml (200 mg/250 ml)
Central: Maximum concentration of 8 mg/ml (400 mg/50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administration via central line is recommended.</td></tr>
<tr><td>References</td><td>
1. Duopharma (M) Sdn. Bhd. Loxin Product Leaflet. Revised 14 Jun 2019.
2. McAuley D. [Internet]. Dopamine Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/dopamine-hydrochloride/
3. NHS. Critical Care Intravenous Drug Administration Guide. 2008.
4. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

EPHEDRINE 30 MG/1 ML

<table>
<tr><td>Brand name</td><td>Ephedrine</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 10 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. NHS. Critical Care Intravenous Drug Administration Guide. 2008.
2. Pharmaniaga. Ephedrine Product Leaflet. Revised 16 May 2017.</td></tr>
</table>

ERTAPENEM 1 G

<table>
<tr><td>Brand name</td><td>Invanz</td></tr>
<tr><td>Reconstitution</td><td>IM: Reconstitute with 3.2 ml 1 or 2% lidocaine (stable for 1 hour)
IV: Reconstitute with 10 ml WFI or NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 20 mg/ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IM: Administer into large muscle mass
IV infusion: Infuse over 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>6 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. McAuley D. [Internet]. Ertapenem Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/ertapenem-invanz/
2. Merck Sharp & Dohme (M).Invanz Product Leaflet. Revised 1 Feb 2021.
</td></tr>
</table>

ERYTHROMYCIN 500 MG

<table>
<tr><td>Brand name</td><td>Eritrotex</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 5 mg/ml
Central: Maximum concentration of 10 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>8 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Thrombophlebitis and arrhythmia may occur when using concentrated (>5 mg/ml) solution. Cardiac monitoring is recommended.</td></tr>
<tr><td>References</td><td>1. FisiopharmaS.r.L. Eritrotex Product Leaflet. Revised 22 Jan 2020.
2. McAuley D. [Internet]. Dopamine Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/erythromycin/
3. NHS. Critical Care Intravenous Drug Administration Guide. 2008.
4. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

ESMOLOL 100 MG/10 ML

<table>
<tr><td>Brand name</td><td>Esocard</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 30 – 60 seconds
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administration via central line is recommended.
▪ Not to be used in in combination with sodium bicarbonate or other medicinal product such as frusemide, diazepam, thiopental.</td></tr>
<tr><td>References</td><td>1. McAuley D. [Internet]. Esmolol Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/esmolol-brevibloc/
2. Samarth Life Sciences Pvt Ltd.Esocard Product Leaflet. Revised 1 Oct 2010. NHS. Critical Care Intravenous Drug Administration Guide. 2008.</td></tr>
</table>

ESOMEPRAZOLE 40 MG

<table>
<tr><td>Brand name</td><td>Esomeprazole</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 5 ml NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Maximum concentration of 0.8 mg/ml (40 mg in 50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 minutes
IV infusion: Infuse over 30 minutes
Continuous infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>6 hours (D5),
12 hours (NS)</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Kotra Pharma. Esomeprazole Product Leaflet (Vaxcel). Revised 26 Feb 2020.
2. McAuley D. [Internet]. Esmolol Dilution. GlobalRPh; 2017. Available from: https://globalrph.com/dilution/esomeprazole-nexium/
</td></tr>
</table>

FACTOR VIII (HUMAN BLOOD COAGULATION FACTOR VIII)

<table>
<tr><td>Brand name</td><td>Fanhdi 250 IU powder and solvent for solution for injection
Fanhdi 500 IU powder and solvent for solution for injection
Fanhdi 1000 IU powder and solvent for solution for injection
MYVATE 250 IU powder and solvent for solution for injection
MYVATE 500 IU powder and solvent for solution for injection
MYVATE 1000 IU powder and solvent for solution for injection
MYVATE 1500 IU powder and solvent for solution for injection
Beriate 250 IU Powder and solvent for solution for injection or infusion
Beriate 500 IU Powder and solvent for solution for injection or infusion
Beriate 1000 IU Powder and solvent for solution for injection or infusion</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute each vial with the provided prefilled syringe with diluent (WFI)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Administer slowly up to a maximum of 10 ml/min. Rapid administration of Factor VIII concentrate may result in vasomotor reaction.</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>24 hours</td><td>8 – 12 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Bioworld Technologies Sdn Bhd. Factor VIII (MYVATE) 250 IU, 500 IU, 1000 IU, 1500 IU Powder and Solvent for Solution for Injection Product Leaflet. Revised 2 May 2018.
2. DKSH (M) Sdn Bhd. Factor VIII (Beriate) 250 IU, 500 IU, 1000 IU Powder and Solvent for Solution for Injection or Infusion Product Leaflet. Revised 23 Aug 2019.
3. Grifols Biologicals Inc. Factor VIII (Fandhi) 250 IU, 500 IU, 1000 IU Product Leaflet. Revised 17 Dec 2007.</td></tr>
</table>

FACTOR VIII/VWF (HUMAN BLOOD COAGULATION FACTOR VIII AND VON WILLEBRAND FACTOR COMPLEX)

<table>
<tr><td>Brand name</td><td>Alphanate®250 IU FVIII/5 mL single dose vial
Alphanate®500 IU FVIII/5 mL single dose vial
Alphanate®1000 IU FVIII/10 mL single dose vial
Alphanate1500 IU FVIII/10 mL single dose vial
Wilate 500, 500 IU VWF/500 IU FVIII, Powder and Solvent for Solution for Injection
Wilate 1000, 1000 IU VWF/1000 IU FVIII, powder and solvent for solution for injection
Octanate 50 IU/ml, 250 IU powder and solvent for solution for injection
Octanate 50 IU/ml, 500 IU powder and solvent for solution for injection
Octanate 100 IU/ml, 1000 IU powder and solvent for solution for injection
Immunate 50 IU/ml, 250 IU FVIII / 190 IU VWF powder and solvent for solution for injection
Immunate 100 IU/ml, 500 IU FVIII / 375 IU VWF powder and solvent for solution for injection
Immunate 100 IU/ml, 1000 IU FVIII / 750 IU VWF powder and solvent for solution for injection
Haemate P Powder and solvent for solution for injection or infusion</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute each vial with the provided prefilled syringe with diluent (sterile WFI)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Administer slowly at a rate not exceeding 10 ml/min. Rapid administration of Factor VIII/VWF concentrate may result in vasomotor reaction.</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstution</td><td>-</td><td>8 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>

1. DKSH (M) Sdn. Bhd. Haemate P 250IU FVIII/ 600IU VWF, 500 IU FVIII /1200 IU VWF, 1000 IU FVIII /2400 IU VWF Powder and Solvent for Solution for Injection. Revised 30 Aug 2019.
2. Grifols Biologicals Inc. Factor VIII/VWF (Alphanate®) 250 IU, 500 IU, 1000 IU, 1500 IU Product Leaflet. Revised Oct 2013.
3. Pharmaniaga. Factor VIII/VWF (OCTANATE) 50 IU/ml, 250 IU Powder and Solvent for Solution for Injection. Revised May 2015.
4. Pharmaniaga. Factor VIII/VWF (Wilate) 500, 500 IU VWF/500 IU FVIII, Powder and Solvent for Solution for Injection Product Leaflet. Revised 3 Aug 2020.
5. Takeda (M) Sdn Bhd. Factor VIII/VWF (IMMUNATE) 50 IU/ml, 100 IU/ml Product Leaflet. Revised 16 Jun 2020.

</td></tr>
</table>

FACTOR IX (HUMAN COAGULATION FACTOR IX)

<table>
<tr><td>Brand name</td><td>AlphaNineSD500 IU FVIII powder and solvent for solution for injection
AlphaNineSD1000 IU FVIII powder and solvent for solution for injection
AlphaNineSD1500 IU FVIII powder and solvent for solution for injection
OCTANINE F 500 IU powder and solvent for solution for injection
OCTANINE F 1000 IU powder and solvent for solution for injection
Immunine 600 IU powder and solvent for solution for injection</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute each vial with the provided prefilled syringe with diluent (WFI)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Administer slowly at a rate not exceeding 10 ml/min. Rapid administration of Factor IX concentrate may result in vasomotor reaction.</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Use immediately and within three hours after reconstitution to avoid potential ill effect of any inadvertent bacterial contamination occurring after reconstitution.</td></tr>
<tr><td>References</td><td>1. Grifols Biologicals Inc. Factor IX (AlphaNine®SD) 500 IU, 1000 IU, 1500 IU Product Leaflet. Revised Dec 2017.
2. Pharmaniaga. Factor XI (OCTANINE F) 500 IU, 1000 IU Product Leaflet. Revised 15 May 2019.
3. Takeda (M) Sdn Bhd. Factor IX (Immunine) 600 IU Product Leaflet (Revised Feb 2020).</td></tr>
</table>

FACTOR VIIA (EPTACOG ALFA)

<table>
<tr><td>Brand name</td><td>NovoSeven 1 mg (50 KIU) powder and solvent for solution for injection
NovoSeven 2 mg (100 KIU) powder and solvent for solution for injection</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute each vial with the provided prefilled syringe with diluent (sterile WFI)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer slowly over 2 – 5 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>24 hours</td><td>6 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Must not be mixed with infusion solutions or be given in a drip.</td></tr>
<tr><td>References</td><td>1. Novo Nordisk Pharma (M) Sdn Bhd. Factor VIIa (NovoSeven®) 1 mg (50 KIU), 2mg (100 KIU) Powder and Solvent for Solution for Injection Product Leaflet. Revised Apr 2021.</td></tr>
</table>

FENTANYL CITRATE 0.1 MG/2 ML

<table>
<tr><td>Brand name</td><td>Talgesil
Fentanyl-Piramal</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Undiluted or maximum concentration of 10 mcg/ml (preferred)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer rapidly
IV infusion, continuous infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Product is preservative free, hence the injection should be freshly prepared and unused portions should be discarded.
▪ Incompatible with thiopental sodium.</td></tr>
<tr><td>References</td><td>1. DKSH (M) Sdn Bhd. Fentanyl-Piramal (Fentanyl) Injection 0.1 mg/2 ml Product Leaflet. Revised Aug 2021.
2. Duopharma (M) Sdn. Bhd. Talgesil (Fentanyl) Injection 0.1 mg/2 ml Product Leaflet. Revised 9 Jul 2019.
3. Fentanyl: Indication, Dosage, Side Effect, Precaution. MIMS Malaysia; [cited 13 Jun 2022]. Available from: https://www.mims.com/malaysia/drug/info/fentanyl?mtype=generic
4. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

FILGRASTIM (RECOMBINANT HUMAN GRANULOCYTE COLONY-STIMULATING FACTOR)

<table>
<tr><td>Brand name</td><td>Neupogen 30 MU/1 ml (300 mcg/ml) vial
Neupogen 30 MU/0.5 ml (300 mcg/0.5 ml) prefilled syringe</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>SC: No further dilution required
IV infusion: Maximum concentration of 15 mcg/ml
*If Neupogen is diluted to less than 15 mcg/ml, 0.2 ml of 20% human albumin should be added.</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>SC (preferred route of administration)
IV infusion: Infuse over 15 – 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Dilution to a final concentration < 2 µg/mL is not recommended at any time.</td></tr>
<tr><td>References</td><td>
1. Amgen Biopharmaceuticals (M) Sdn Bhd. Filgrastim (Neupogen®) 30 MU/ml Vial Product Leaflet. Revised Aug 2018.
2. Cipla (M) Sdn Bhd. Filgrastim (Filpegla) 6 mg /0.6 ml Solution for Injection in Pre-Filled Syringe Product Leaflet. Revised Sept 2020.
3. Hospira (M) Sdn Bhd. Filgrastim (Nivestim) 120 µg/0.2 ml, 300 µg/0.5 ml, 480 µg/0.5 ml Solution for Injection/Infusion Product Leaflet. Revised 18 Feb 2020.
4. Mylan Healthcare Sdn Bhd. Filgrastim (Fulphila™) Pegylated Granulocyte Colony Stimulating Factor Injection (PEG-GCSF Injection) 6 mg/0.6 ml Pre-filled Syringe Product Leaflet. Revised Nov 2020.
</td></tr>
</table>

FLUCONAZOLE

<table>
<tr><td>Brand name</td><td>Diflucan 100 mg/50 ml intravenous infusion
Diflucan 200 mg/100 ml intravenous infusion
Fluconol 100 mg/50 ml intravenous infusion
Fluconol 200 mg/100 ml intravenous infusion
Flucon 100 mg/50 ml intravenous infusion</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 60 minutes, at rate <10 ml/min</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Ain Medicare Sdn Bhd. Fluconazole (Fluconol®) 100 mg/50 ml, 200 mg/100 ml Intravenous Infusion Product Leaflet. Revised 1 Sept 2019.
2. Averroes Pharmaceuticals. Fluconazole (Flucon) 100 mg/50 ml Intravenous Infusion Product Leaflet. Revised Jun 2007.
3. Pfizer (M) Sdn Bhd. Fluconazole (Diflucan) 100 mg/50 ml, 200 mg/100 ml Intravenous Infusion Product Leaflet. Revised 4 Aug 2021.
</td></tr>
</table>

FRUSEMIDE 20 MG/2 ML

<table>
<tr><td>Brand name</td><td>Fusix</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer undiluted
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. SM Pharmaceuticals Sdn Bhd. Fusix (Frusemide) Injection 20 mg/2 ml Ampoule Product Leaflet. Revised 07 Mar 2019.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

FUSIDIC ACID 500 MG

<table>
<tr><td>Brand name</td><td>-</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 2 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over at least 2 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Fusidic acid: Indication, Dosage, Side Effect, Precaution. MIMS Malaysia; [cited 30 Jun 2022]. Available from: https://www.mims.com/malaysia/drug/info/fusidic%20acid?mtype=generiVivocin
2. Steril/Non-Steril Preparation Working Committee Members. Johore Antibiotics Dilution Quick Reference
</td></tr>
</table>

GANCICLOVIR 500 MG

<table>
<tr><td>Brand name</td><td>Cymevene</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 10 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>12 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Infusion concentrations greater than 10 mg/ml are not recommended.</td></tr>
<tr><td>References</td><td>1. DKSH (M) Sdn Bhd. Ganciclovir (Cymevene®) 500 mg/vial Powder for Concentrate for Infusion. Revised Jan 2021.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

GENTAMICIN 80 MG/2 ML

<table>
<tr><td>Brand name</td><td>Garasent</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Dilute in at least 50 – 100 ml diluent and infuse over 30 – 60 minutes</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 2 – 3 minutes
IV infusion: Infuse over 30 minutes – 2 hours (preferred)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>48 hours</td><td>48 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ High doses may require longer infusion time (up to 2 hours).</td></tr>
<tr><td>References</td><td>
1. Duopharma (M) Sdn Bhd. Gentamicin (Garasent) 80 mg/2 ml Ampoule, 280 mg/2 ml Product Leaflet. Revised 28 May 2019.
2. McAuley D. [Internet]. Gentamicin Dilution. GlobalRPh;2017. Available from: https://globalrph.com/dilution/gentamicin/
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. Dec 2012.
</td></tr>
</table>

GLUCAGON 1 MG

<table>
<tr><td>Brand name</td><td>GlucaGen</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with provided diluent</td></tr>
<tr><td>Suggested minimum dilutions</td><td><u>IM, SC, IV bolus</u>
No further dilution required

<u>IV infusion</u>
Peripheral: Maximum concentration of 0.1 mg/ml
Central: No further dilution required</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>IM, SC
IV bolus: Administer over 3 – 5 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Dilution</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>Comments</td><td>▪ Use immediately after reconstitution</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
2. Novo Nordisk Pharma (M) Sdn. Bhd. GlucaGen® Product Leaflet. Revised Jul 2020.
3. Pharmaceutical Services Programme. Antidote Quick Guide. 1st ed. Ministry of Health; 2022.
4. UpToDate. Glucagon Drug Information. Wolters Kluwer.</td></tr>
</table>

GLYCERYL TRINITRATE 50 MG/10 ML

<table>
<tr><td>Brand name</td><td>Gitrinil</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 1 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Glyceryl trinitrate should not be given by bolus injection.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn Bhd. Gitrinil 50 mg/10 ml Injection Product Leaflet. Revised 12 Jun 2019.
2. Hameln Pharma. Glyceryl Trinitrate-Hameln 1 mg/ml Injection Product Leaflet. Revised Sept 2020.
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

GLYCOPYRROLATE 200 MCG/1 ML

<table>
<tr><td>Brand name</td><td>Pyronium</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer over 1 – 2 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
2. SM Pharmaceuticals Sdn Bhd. Pyronium Product Leaflet. Revised Sept 2017.
3. UpToDate. Glycopyrrolate Drug Information. Wolters Kluwer.</td></tr>
</table>

GRANISETRON 1 MG/ML

<table>
<tr><td>Brand name</td><td>Kytron 1 mg/1 ml & 3 mg/3 ml
Granisetron Kabi 1 mg/1 ml
Granil 3 mg/3 ml</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Dilute required dose in 20 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 30 seconds
IV infusion: Infuse over 5 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Duopharma (M) Sdn Bhd. Kytron Product Leaflet. Revised 15 Oct 2019.
2. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
3. McAuley D. [Internet]. Kytril-Granisetron. GlobalRPh;2017. Available from: https://globalrph.com/dilution/granisetron-kytril/
4. UpToDate. Granisetron Drug Information. Wolters Kluwer.
</td></tr>
</table>

HALOPERIDOL 5 MG/1 ML

<table>
<tr><td>Brand name</td><td>Manace</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution needed</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer not exceeding 5 mg/min</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn Bhd. Manace Product Leaflet. Revised 11 Sept 2019.</td></tr>
</table>

HEPARIN 5,000 IU/5 ML & HEPARIN 25,000 IU/5 ML

<table>
<tr><td>Brand name</td><td>Heparinol</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>SC: No further dilution required
IV infusion: Refer to institutional heparin protocol</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>SC
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn Bhd. Heparinol Product Leaflet. Revised 1 Aug 2020.
2. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
3. UpToDate. Heparin Drug Information. Wolters Kluwer.</td></tr>
</table>

HUMAN ALBUMIN 20% (10 G/50ML & 20 G/100 ML)

<table>
<tr><td>Brand name</td><td>Human Albumin Grifols 20%
Albumex 20 Human Albumin 20%</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse each vial over 30 minutes – 4 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. CSL Behring Australia Pty Ltd. Albumex® 20 Human Albumin 20% (200 g/L) Product Leaflet. Revised 4 Mar 2015.
2. Grifols (M) Sdn Bhd. Human Albumin Grifols 20% Product Leaflet. Revised Dec 2002.
3. Truven Health Analytics. Micromedex.</td></tr>
</table>

HUMAN ALBUMIN 25% (12.5 G/50 ML & 25 G/100 ML)

<table>
<tr><td>Brand name</td><td>Plasbumin® -25</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse each vial over 30 minutes – 4 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Grifols (M) Sdn Bhd. Product Insert for Human Albumin 25% by Plasbumin®-25. Revised Oct 2016.
2. Grifols (M) Sdn Bhd. Human Albumin Grifols 25% (12.5 g/50 ml, 25 g/100 ml) Product Leaflet. Revised Dec 2017.
3. Truven Health Analytics. Micromedex.
</td></tr>
</table>

HYDRALAZINE 20 MG/1 ML

<table>
<tr><td>Brand name</td><td>Hydralazine hydrochloride</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution needed</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer over 3 – 5 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Ciron Drugs & Pharmaceuticals Pvt. Ltd. Hydralazine Hydrochloride 20 mg/ml Product Leaflet. Revised 5 Apr 2022)
2. UpToDate. Hydralazine Drug Information. Wolters Kluwer.</td></tr>
</table>

HYDROCORTISONE 100 MG

<table>
<tr><td>Brand name</td><td>Zycort</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with not more than 2 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution is required</td></tr>
<tr><td>Diluent</td><td>-</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 5 – 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>-</td><td>72 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ If further dilution is needed, 100 mg doses may be added to 50 ml NS or D5 (stable for 4 hours).</td></tr>
<tr><td>References</td><td>1. SM Pharmaceuticals Sdn. Bhd. Product Insert for Zycort. Revised 24 Oct 2018.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

ILOPROST 0.5 ML
(CONTAINS 67 MCG ILOPROST TROMETAMOL EQUIVALENT TO 50 MCG ILOPROST)

<table>
<tr><td>Brand name</td><td>Ilomedin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>For infusion pump use: Maximum concentration of 0.2 mcg/ml
For syringe pump use: Maximum concentration of 2 mcg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Solution must not be administered undiluted.
▪ The infusion solution should be made up freshly each day to ensure sterility.</td></tr>
<tr><td>References</td><td>1. Bayer. Iloprost (Ilomedin) Product Leaflet. Revised 14 Oct 2013.</td></tr>
</table>

IMIPENEM/CILASTATIN 500 MG

<table>
<tr><td>Brand name</td><td>Imipenem/Cilastatin Kabi</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 5 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS (preferred)</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 minutes – 3 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>4 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Fresenius Kabi Malaysia Sdn. Bhd. Imipenem/cilastatin Kabi Product Leaflet. Revised Jan 2020.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

IMMUNOGLOBULIN G (IVIG)

<table>
<tr><td>Brand name</td><td>Flebogamma 5% DIF (2.5 g/50 ml)
Intragam P (3 g/50 ml)</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse at an initial rate of 0.01 – 0.02 ml/kg/min for the first 30 minutes. If well tolerated, the rate may gradually be increased to a maximum of 0.1 ml/kg/min</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Should be administered by separate IV line.
▪ Administration rate may differ between brands.</td></tr>
<tr><td>References</td><td>1. CSL Behring (Australia) Pty Ltd. Product Insert for Intragam P. Revised Nov 2020.
2. Grifols (M) Sdn Bhd. Product Insert for Flebogamma 5% DIF. Revised Aug 2011.</td></tr>
</table>

INSULIN REGULAR

<table>
<tr><td>Brand name</td><td>Actrapid</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>SC, IV bolus: No further dilution required
IV infusion: Maximum concentration of 0.5 – 1 IU/ml</td></tr>
<tr><td>Diluent</td><td>D5, D10, NS</td></tr>
<tr><td>Administration</td><td>SC, IV bolus
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Novo Nordisk. Actrapid® Product Leaflet. Revised 2019.</td></tr>
</table>

IRON DEXTRAN 100 MG/2 ML

<table>
<tr><td>Brand name</td><td>CosmoFer</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Refer to Administration</td></tr>
<tr><td>Diluent</td><td>NS (recommended), D5</td></tr>
<tr><td>Administration</td><td>IV Injection
<table>
<tr><th></th><th>Slow IV</th><th>IV infusion</th><th>Total dose infusion</th></tr>
<tr><td>Test dose</td><td>Administer 25 mg over 1 – 2 minutes</td><td>Administer 25 mg over 15 minutes</td><td>Administer 25 mg over 15 minutes</td></tr>
<tr><td>Observation period</td><td colspan="3">Observe for hypersensitivity reaction for at least 15 minutes after test dose</td></tr>
<tr><td>Dose</td><td>100 – 200 mg</td><td>100 – 200 mg</td><td>Max per dose: 20 mg/kg</td></tr>
<tr><td>Volume of diluent</td><td>10 – 20 ml</td><td>100 ml</td><td>500 ml</td></tr>
<tr><td>Rate</td><td>Administer over 10 – 20 minutes</td><td>Infuse over at least 30 minutes</td><td>Infuse over 4 – 6 hours</td></tr>
</table>
Deep IM
Administer undiluted in doses of up to 100 mg in the upper outer quadrant of the buttocks, alternate buttocks with subsequent injections.</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Discontinue oral iron preparations before starting IV therapy as concomitant use can cause the absorption of oral iron to be reduced. Oral iron should not be given within 5 days of last injection.</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
2. Pharmacosmos. Iron Dextran 50 mg/ml Product Leaflet. Revised Mar 2019.</td></tr>
</table>

IRON SUCROSE 100 MG/5 ML

<table>
<tr><td>Brand name</td><td>Ranofer</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Maximum concentration of 1 mg/ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>I. <u>Test dose (20 mg iron, 1 ml)</u>
IV bolus: Administer over 1 – 2 minutes
IV infusion: Infuse over 15 minutes
If no adverse reactions occur, the remaining dose can be administered.

II. <u>Total dose</u>
IV bolus: Administer no faster than 20 mg per minute
IV infusion: Infuse no faster than 6 mg per minute (100 mg over at least 15 minutes)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Monitor signs and symptoms of hypersensitivity reaction and hypotension during and after administration.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn Bhd. Ranofer Product Leaflet. Revised Apr 2019.
2. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
3. Truven Health Analytics. Micromedex.</td></tr>
</table>

ISOPRENALINE 0.2 MG/1 ML & 1 MG/5 ML

<table>
<tr><td>Brand name</td><td>Isolin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 20 mcg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ 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.
▪ If HR > 110 bpm, it is advisable to decrease the infusion rate or temporarily discontinue.</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
2. Samarth Life Sciences. Isolin Product Leaflet.
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

ISOSORBIDE DINITRATE 10 MG/10 ML (0.1%)

<table>
<tr><td>Brand name</td><td>Isoket</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 0.5 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>

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.
Due to oversaturation of active ingredient, crystallization may occur in undiluted form.

</td></tr>
<tr><td>References</td><td>

Isosorbide Dinitrate 0.05% w/v Solution for Injection or Infusion. Torbay & South Devon NHS Foundation Trust; 2019. Available from: https://www.medicines.org.uk/emc/product/1994/smpc#gref
Gray AH. Injectable Drugs Guide. London: Pharmaceutical Press; 2011.
GSK. Isosorbide Dinitrate (Isoket®) Product Leaflet. Revised 2014.

</td></tr>
</table>

KETAMINE 200 MG/20 ML

<table>
<tr><td>Brand name</td><td>Aneket</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer at 0.5 mg/kg/min
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Rapid administration of IV bolus may result in respiratory depression and enhance pressor response (suggest to administer over 2 – 3 minutes).
▪ Do not mix with barbiturates or diazepam in the same syringe (precipitate formation is possible).</td></tr>
<tr><td>References</td><td>1. Neon Laboratories. Aneket Ketamine HCl Injection USP Product Leaflet.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
3. Uptodate. Ketamine Drug Information. Wolters Kluwer.</td></tr>
</table>

LABETALOL 25 MG/5 ML

<table>
<tr><td>Brand name</td><td>Labetalol Hydrochloride</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 1 – 2 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Patients should remain supine during and for up to 3 hours following injection (postural hypotension may occur).</td></tr>
<tr><td>References</td><td>
1. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
2. Pharmaniaga. Labetalol HCl Injection Product Leaflet. Revised 19 Apr 2017.
3. Phelps SJ, Hageman TM, Thompson AJ, Lee KR. Pediatric injectable drugs ; the teddy bear book /by Stephanie J.Phelps, Emily B. Hak and Catherine M. Crill. 10th ed. Bethesda: American Society of Health-System Pharmacists; 2013.
4. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

LEUCOVORIN CALCIUM 50 MG/5 ML

<table>
<tr><td>Brand name</td><td>Leucovorin Calcium</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution is required</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer over 3 minutes
IV infusion: Infuse over 15 minutes – 2 hours (rate not to exceed 160 mg/min)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Leucovorin should not be mixed in the same infusion as 5-fluorouracil since this may lead to formation of precipitate.
▪ Protect from light.</td></tr>
<tr><td>References</td><td>1. Fresenius Kabi. Leucovorin Calcium Inj. USP Product Leaflet. Revised Jan 2018.
2. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
3. McAuley D. [Internet]. Leucovorin Calcium. GlobalRPh;2017. Available from: https://globalrph.com/oncology/leucovorin-calcium/</td></tr>
</table>

LEVETIRACETAM 500 MG/5 ML

<table>
<tr><td>Brand name</td><td>Epitech
Keppra</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 15 mg/ml (1500 mg in 100 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 15 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Averroes Pharmaceuticals. Epitech Product Leaflet. Revised 5 Nov 2020.
2. Lexi-Comp Inc. Lexi-Drug©. Version 6.4.0.
3. Patheon Italia S.p.A. Keppra Product Leaflet. Revised 13 Mar 2020.
4. Truven Health Analytics. Micromedex. Version 3.2.0.
</td></tr>
</table>

LEVOFLOXACIN 500 MG/100 ML

<table>
<tr><td>Brand name</td><td>Levofloxol</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>Dose < 500 mg: Infuse over 60 minutes
Dose ≥ 750 mg: Infuse over 90 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn Bhd. Package Insert Levofloxol Injection 500mg/100ml. Revised 9 Feb 2009.</td></tr>
</table>

LIGNOCAINE HCL 20 MG/ML (PRESERVATIVE FREE)

<table>
<tr><td>Brand name</td><td>INJECSOL LIG2 2% w/v</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer at rate of 25 – 50 mg/min
Continuous infusion: Infusion rate of 1 – 4 mg/min</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ In cardiac arrest (e.g.: ventricular fibrillation or pulseless ventricular tachycardia), lignocaine may be administered rapidly into peripheral vein.
▪ Infusion should be given under ECG monitoring to avoid toxicity.</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn. Bhd. Package Insert INJECSOL LIG2 2% w/v. Revised 26 Aug 2019.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

LINEZOLID 600 MG/300 ML

<table>
<tr><td>Brand name</td><td>Zyvox</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 – 120 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Keep infusion bags in foil overwrap until ready to use.
▪ Linezolid solution is chemically incompatible when combined with ceftriaxone sodium.</td></tr>
<tr><td>References</td><td>1. Pfizer (M) Sdn Bhd. Package Insert Zyvox 2mg/ml. Revised 11 Aug 2017.</td></tr>
</table>

MAGNESIUM SULPHATE 50% W/V 5 ML
(CONTAINS 2.465 G MAGNESIUM EQUIVALENT TO 10 MMOL MAGNESIUM)

<table>
<tr><td>Brand name</td><td>INJECSOL $MgSO_4$</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 10% (1 ampoule in 50 ml)
Central: No further dilution required</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM: Undiluted
IV infusion (Hypomagnesemia): Infuse over 60 minutes
IV infusion (Asthma/Pre-Eclampsia/Eclampsia): Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Incompatible with calcium salts, as calcium sulphate may precipitate when mixed together in the same intravenous solution.</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn. Bhd. Package Insert INJECSOL $MgSO_4$. Revised 8 Oct 2020.
2. McAuley D. [Internet]. Magnesium Sulfate Dilution. GlobalRPh;2017. Available from: https://globalrph.com/dilution/magnesium-sulfate/.
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

MANNITOL 10% & 20%

<table>
<tr><td>Brand name</td><td>Infusol M10 / M20</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Use filter to avoid administration of crystallize solution.
▪ If crystallization occurs, warm up the solution to 70°C (using water bath) until crystals dissolve.</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn. Bhd. Package Insert Infusol® M10 / M20. Revised 1 Apr 2020.</td></tr>
</table>

MEROPENEM 500 MG & 1 G

<table>
<tr><td>Brand name</td><td>Meropenem Kabi</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute every 500 mg with 5 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV infusion: Maximum concentration of 20 mg/ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Infuse over at least 5 minutes
IV infusion: Infuse over 30 minutes or as extended over 4 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>8 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Alternatively can be diluted with D5 (stability 1 hour)</td></tr>
<tr><td>References</td><td>
1. Fresenius Kabi. Product Leaflet Meropenem Kabi 500 mg/1g. Revised Apr 2018.
2. Loeuille G, D'Huart E, Vigneron J et al. Stability Studies of 16 Antibiotics for Continuous Infusion in Intensive Care Units and for Performing Outpatient Parenteral Antimicrobial Therapy. Antibiotics (Basel). 2022;11(4):458.
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

METHYLENE BLUE (METHYLTHIONINIUM CHLORIDE)

<table>
<tr><td>Brand name</td><td>Blue Beam</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>-</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 5 – 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Product is hypotonic. Thus, it may be diluted in 50 ml D5 to avoid local pain.
▪ Do not mix with NS as it has been demonstrated that chloride reduces the solubility of methylene blue.</td></tr>
<tr><td>References</td><td>1. Provepharm Life Solutions. Package Insert PROVAYBLUE™. Revised Apr 2016.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

METHYLPREDNISOLONE 500 MG & 1000 MG

<table>
<tr><td>Brand name</td><td>Solu-Medrol</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with diluent provided</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 5 mg/ml
Central: No further dilution required</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus (Dose < 250 mg): Administer over 5 minutes
IV infusion (Dose ≥ 250 mg): Infuse over at least 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>48 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. McAuley D. [Internet]. Solu Medrol-Methylprednisolone Dilution. GlobalRPh;2017. Available from: https://globalrph.com/dilution/methylprednisolone-solu-medrol/
2. Pfizer (M) Sdn. Bhd. Package Insert Solu-Medrol 500mg, 1000mg. Revised 2 Jul 2021.
3. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.
</td></tr>
</table>

METOCLOPRAMIDE 10 MG/2ML

<table>
<tr><td>Brand name</td><td>Malon</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer over at least 3 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Dose > 10 mg requires dilution in at least 50 ml NS.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Package Insert Malon Injection 10 mg/2 ml. Revised 6 Apr 2020.</td></tr>
</table>

METRONIDAZOLE 500 MG/100ML

<table>
<tr><td>Brand name</td><td>Metronol</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>Infuse over 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn. Bhd. Package Insert Metronol® 0.5% w/v Injection. Revised 1 Jul 2019.</td></tr>
</table>

MICAFUNGIN 50 MG

<table>
<tr><td>Brand name</td><td>Mycamine</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute each vial with 5 ml NS or D5</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 1 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>6 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Astellas Pharma Tech Co. Ltd. Package Insert Mycamine 50 mg. Revised 22 Aug 2017.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

MIDAZOLAM 5 MG/ML & 15 MG/3 ML

<table>
<tr><td>Brand name</td><td>Domi</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus (procedural sedation): Administer over at least 2 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Generally diluted in D5 or NS to a concentration of 1 mg/ml (stable for 24 hours).</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Package Insert Domi Injection 5mg/ml. Revised 14 Jan 2021.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

MILRINONE 10 MG/10 ML

<table>
<tr><td>Brand name</td><td>Primacor</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 0.2 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 10 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

MORPHINE 10 MG/1 ML

<table>
<tr><td>Brand name</td><td>Morpheas</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 2 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>SC
IV bolus: Administer over 4 – 5 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Generally diluted in D5 or NS to a concentration of 1 mg/ml.</td></tr>
<tr><td>References</td><td>1. Duopharma (M). Sdn. Bhd. Package Insert Morpheas Injection 10mg/ml. Revised 13 Feb 2020.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

MOXIFLOXACIN 400 MG/250 ML

<table>
<tr><td>Brand name</td><td>Avelox</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Bayer. Package Insert Avelox. Revised 27 Nov 2020.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

NALOXONE 0.4 MG/1 ML

<table>
<tr><td>Brand name</td><td>Mapin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution is required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 - 5 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ May further dilute in 10 ml D5 or NS (concentration 0.04 mg/ml), administer over 3 - 5 minutes.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Package Insert MAPIN 0.4 mg/ml Injection. Revised 13 Mar 2019.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

NEOSTIGMINE METHYLSULPHATE 2.5 MG/1 ML

<table>
<tr><td>Brand name</td><td>Setisin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>-</td></tr>
<tr><td>Administration</td><td>IM, SC
IV bolus: Administer over at least 1 minute</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Dose equivalent 0.5 mg IV = 1.0 – 1.5 mg IM/SC.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Package Insert Neostigmine Methylsulphate BP; Setisin Injection. Revised 22 Nov 2019.</td></tr>
</table>

NIMODIPINE 10 MG/50 ML

<table>
<tr><td>Brand name</td><td>Nimotop</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion (central line only):
BW < 70 kg: Infuse 0.5 mg/hour or less
BW ≥ 70 kg: Infuse 1 mg/hour for 2 hours, then 2 mg/hour

Nimodipine solution should be co-infused with 1:4 ratio of NS or D5 via a three-way stopcock (e.g.: Nimodipine 50 ml : co-infusion 200 ml)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Bayer. Package Insert Nimotop ® 10mg/50ml. Revised 20 Aug 2019.</td></tr>
</table>

NORADRENALINE 4 MG/4 ML

<table>
<tr><td>Brand name</td><td>Cardiamed</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 0.08 mg/ml (4 mg in 50 ml)
Central: Maximum concentration of 0.64 mg/ml (32 mg in 50 ml)</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Preferred dilution ranges from 4 – 8 mg in 50 ml (0.08 – 0.16 mg/ml).
▪ Administration via central line is recommended.
▪ Highly concentrated preparation may cause peripheral ischemia, use with caution.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Package Insert Cardiamed Injection 1mg/ml. Revised 31 Oct 2019.
2. United Kingdom Clinical Pharmacy Association. Minimum Infusion Volumes for Critically Ill Patients. 4th ed. December 2012.</td></tr>
</table>

OCTREOTIDE 0.05 MG/1 ML & 0.1 MG/1 ML

<table>
<tr><td>Brand name</td><td>Sandostatin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>SC, IV bolus: No further dilution required
IV infusion: Maximum concentration of 10 mcg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>SC
IV bolus: Administer over 3 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ NS is the preferred diluent as octreotide can affect glucose homeostasis.</td></tr>
<tr><td>References</td><td>1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf.
2. Package Insert Sandostatin® 0.05mg/ml or 0.1mg/ml or 0.5mg/ml. Novartis (M) Sdn. Bhd. Revised Sept 2021.</td></tr>
</table>

OMEPRAZOLE 40 MG

<table>
<tr><td>Brand name</td><td>Vaxcel Omeprazole</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml solvent provided</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over at least 3 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>-</td><td>4 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Protect from light. Vials that have been taken out of their original box can be kept in normal indoor light up to 24 hours.</td></tr>
<tr><td>References</td><td>1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf.
2. Package Insert Vaxcel Omeprazole 40mg Injection. Kotra Pharma. Revised 27 Nov 2020.</td></tr>
</table>

ONDANSETRON 8 MG/4 ML

<table>
<tr><td>Brand name</td><td>Ondatron</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Dose 4 – 8 mg: No further dilution required
Dose > 8 mg: Maximum concentration of 0.32 mg/ml (16 mg in 50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus (Dose 4 – 8 mg): Administer over 2 – 5 minutes
IV infusion (Dose > 8 mg): Infuse over at least 15 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Alternatively, 4 mg dose may be administered intramuscularly (undiluted) as a single injection for adults.</td></tr>
<tr><td>References</td><td>1. Ain Medicare Sdn. Bhd. Package Insert Ondatron 2 mg/ml. Revised 1 Jun 2020.
2. McAuley D. Zofran ® – Ondansetron [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/zofran-ondansetron/</td></tr>
</table>

PAMIDRONATE 30 MG/10 ML

<table>
<tr><td>Brand name</td><td>Pamisol</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 0.36 mg/ml (90 mg in 250ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 2 – 24 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administer through a separate infusion line. Do not allow pamidronate disodium infusion to come in contact with any calcium or divalent cation-containing solutions.
▪ Longer infusion time > 2 hours may reduce risk for renal toxicity.</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
2. Pamisol Product Leaflet. Pfizer. Revised Sept 2020.</td></tr>
</table>

PANTOPRAZOLE 40 MG

<table>
<tr><td>Brand name</td><td>Vaxcel</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: Maximum concentration of 4 mg/ml (40 mg in 10 ml)
IV infusion: Maximum concentration of 2 mg/ml (40 mg in 20 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 2 – 15 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Do not administer other IV solution simultaneously through the same line.</td></tr>
<tr><td>References</td><td>
1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
2. Kotra Pharma. Vaxcel Product Leaflet. Revised 22 Feb 2019.
3. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
4. McAuley D. Zofran ® – Pantoprazole-Protonix [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/pantoprazole/
</td></tr>
</table>

PARACETAMOL 1 G/100 ML

<table>
<tr><td>Brand name</td><td>Paracetamol Kabi
Ifimol IV</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 15 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ May be further diluted to 1/10 of current dilution (1 part paracetamol to 9 parts D5 or NS).</td></tr>
<tr><td>References</td><td>1. Fresenius Kabi. Paracetamol Kabi Product Leaflet. Revised Jun 2014.
2. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].</td></tr>
</table>

PARECOXIB 40 MG

<table>
<tr><td>Brand name</td><td>Dynastat</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 2 ml D5 or NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer rapidly</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Use of WFI for reconstitution is not recommended (solution is not isotonic).</td></tr>
<tr><td>References</td><td>1. Pfizer. Dynastat Product Leaflet. Revised 10 Sept 2018.</td></tr>
</table>

PARENTROVITE (AMPOULE NO. 1, 5 ML & AMPOULE NO. 2, 5 ML) (CONTAINS ASCORBIC ACID, NICOTINAMIDE, PANTOTHENIC ACID, PYRIDOXINE, RIBOFLAVIN AND THIAMINE)

<table>
<tr><td>Brand name</td><td>Trovite</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Maximum concentration of 1 pair in 50 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 10 minutes
IV infusion: Infuse over 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>Mixed Ampoules (Before Dilution)</td><td>-</td><td>4 hours</td></tr>
<tr><td>After Dilution</td><td>-</td><td>4 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ IV infusion is the preferred method of administration.</td></tr>
<tr><td>References</td><td>1. Duopharm (M) Sdn. Bhd. Trovite Product Leaflet. Revised 5 Sept 19.</td></tr>
</table>

PENTAMIDINE 300 MG

<table>
<tr><td>Brand name</td><td>DBL Pentamidine Isethionate</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 3 to 5 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IM: No further dilution required
IV infusion: Maximum concentration of 6 mg/ml (300 mg in 50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM: Deep IM
IV infusion: Infuse over 60 – 120 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
2. Pfizer. DBL Pentamidine Isethionate Product Leaflet. Revised 8 Feb 2018.</td></tr>
</table>

PHENOBARBITAL SODIUM 200 MG/1 ML

<table>
<tr><td>Brand name</td><td>Phenobarbital Sodium</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td><u>IM</u>
No further dilution required

<u>IV infusion</u>
Dose < 100 mg: Dilute with 50 ml
Dose > 100 mg: Dilute with 100 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM: Deep IM. Not to exceed a volume of 5 ml per injection site (risk of tissue irritation)
IV infusion: Not to exceed rate of 60 mg/min</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Dilution</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
2. Product Leaflet Phenobarbital Sodium Injection. Revised Jan 2018.</td></tr>
</table>

PHENYLEPHRINE 10 MG/1ML

<table>
<tr><td>Brand name</td><td>Zyphrin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 1 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS (preferred)</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 20 – 30 seconds
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>4 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Central line is preferred if administered via continuous infusion (extravasation may cause severe ischemic necrosis).</td></tr>
<tr><td>References</td><td>
1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf.
2. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
</td></tr>
</table>

PHENYTOIN 250 MG/5 ML

<table>
<tr><td>Brand name</td><td>Pharmaniaga phenytoin sodium</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 10 mg/ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Rate not exceeding 50 mg/min. Complete within 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>

Intravenous solutions should be preceded by a saline flush and followed by an injection of sterile saline through the same needle or catheter to avoid local venous irritation due to the alkalinity of the solution:

Fluid restricted patients: 10 ml NS
Non-fluid restricted patients: 50 ml NS

</td></tr>
<tr><td>References</td><td>

1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
2. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
3. Pharmaniaga. Phenytoin Sodium 250 mg/5 ml Injection Leaflet. Revised 30 May 2017.

</td></tr>
</table>

PHYTOMENADIONE 10 MG/1ML

<table>
<tr><td>Brand name</td><td>Kisan</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Should not exceed 1 mg/min</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ IM administration are not advisable due to difficulties with the re-institution of anticoagulation therapy and risk of haematoma formation.</td></tr>
<tr><td>References</td><td>1. Duopharma (M) Sdn. Bhd. Product Leaflet Kisan Injection 10 mg/ml. Revised 23 May 2019.</td></tr>
</table>

PIPERACILLIN/TAZOBACTAM 4.5 G (PIPERACILLIN 4 G & TAZOBACTAM 0.5 G)

<table>
<tr><td>Brand name</td><td>Aurotaz-P</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 20 ml NS or WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 20 – 30 minutes or as extended over 4 hours</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>48 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Further dilution with 50 ml D5 or NS is recommended for extended infusion administration.</td></tr>
<tr><td>References</td><td>
1. Aurobindo Pharma Ltd. Aurotaz-P Product Leaflet. Revised Aug 2019.
2. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
3. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
4. Medscape. Version 1124.0. WebMD, LLC. [cited 2023 Apr 18].
</td></tr>
</table>

PIRACETAM 1 G/5 ML

<table>
<tr><td>Brand name</td><td>YSP Knowful</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Dilute with diluent for IV infusion</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over several minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. MIMS Online. Knowful-Piracetam [Internet]. MIMS. [cited 2023 Apr 18]. Available from: https://www.mims.com/malaysia/drug/info/knowful
2. Medscape. Version 1124.0. WebMD, LLC. [cited 2023 Apr 18].
3. Y.S.P. Industries (M). Product leaflet YSP Knowful Injection 200 mg/ml. Revised 25 Aug 2015.
</td></tr>
</table>

POLYMYXIN B SULPHATE 500,000 UNITS (50 MG)

<table>
<tr><td>Brand name</td><td>Poly-MxB</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml NS</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IT: No further dilution required
IV infusion: Maximum concentration of 20,000 units/ml (2 mg/ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IT: Use a preservative-free preparation for IT administration
IV infusion: Infuse over 60 – 90 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Bharat Serums and Vaccines Ltd. Poly-MxB Product Leaflet. Revised 31 Oct 18.
2. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
3. Lim TP, Hee DK, Lee W, Teo JQ, Cai Y, Chia SY, Leaw JY, Lee SJ, Lee LS, Kwa AL. Physicochemical Stability Study of Polymyxin B in Various Infusion Solutions for Administration to Critically Ill Patients. Annals of Pharmacotherapy. 2016 Sep;50(9):790-2.
</td></tr>
</table>

POTASSIUM CHLORIDE 10% W/V 10 ML
(CONTAINS 1 G POTASSIUM CHLORIDE EQUIVALENT TO 13.4 MMOL POTASSIUM, 13.4 MMOL CHLORIDE)

<table>
<tr><td>Brand name</td><td>Injecsol K10</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 1 g potassium chloride (13.4 mmol potassium) in at least 140 ml
Central: Maximum concentration of 1 g potassium chloride (13.4 mmol potassium) in at least 34 ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>Peripheral: Infuse 1 g potassium chloride (13.4 mmol potassium) over at least 60 minutes
Central: Infuse 1 g potassium chloride (13.4 mmol potassium) over at least 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Do not administer undiluted or by IV push; may cause fatal cardiac arrest.
▪ Dilution in glucose solution may decrease serum potassium concentration, producing intracellular shift.</td></tr>
<tr><td>References</td><td>
1. Ain Medicare Sdn. Bhd. Product Leaflet Potassium Chloride 10% w/v Injection BP. Revised 1 Jun 2020.
2. Gray A. Injectable drugs guide. Pharmaceutical Press; 2011.
3. McAuley D. Potassium Chloride – KCl. [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/potassium-chloride-kcl/
4. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/potassium-chloride-drug-information.
</td></tr>
</table>

POTASSIUM DIHYDROGEN PHOSPHATE 10 ML
(CONTAINS 10 MMOL POTASSIUM & 10 MMOL PHOSPHATE)

<table>
<tr><td>Brand name</td><td>DBL Potassium Dihydrogen Phosphate</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 10 mmol phosphate in 250 ml
Central: Maximum concentration of 10 mmol phosphate in 50 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse no faster than 7.5mmol phosphate per hour (recommended 4 – 6 hours)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Phosphates are incompatible with calcium and/or magnesium containing solutions.</td></tr>
<tr><td>References</td><td>
1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
2. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
3. Pfizer. Product leaflet DBL Potassium Dihydrogen Phosphate Concentrated Injection. Revised 25 Jun 2019.
</td></tr>
</table>

PRALIDOXIME 500 MG/20 ML INJECTION

<table>
<tr><td>Brand name</td><td>Pampara</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td><u>Loading dose</u>
No further dilution required

<u>Maintenance dose</u>
I. Fluid restricted patients: No further dilution required
II. Non-fluid restricted patients: Maximum concentration of 20 mg/ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td><u>IV bolus, IV infusion</u>
I. Loading dose: Administer over at least 5 minutes
II. Maintenance dose: Infuse over 15 – 30 minutes (not to exceed 200 mg/min)</td></tr>
<tr><td>Stability</td><td><table><tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr><tr><td>After Dilution</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Averroes Pharmaceuticals. Product Leaflet Pampara Injection 500 mg/20 ml. Revised 22 Nov 2017.</td></tr>
</table>

PROCYCLIDINE 10 MG/2 ML

<table>
<tr><td>Brand name</td><td>Cyclid
Kemadrin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer rapidly</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Incepta Pharmaceuticals Ltd. Product Leaflet Cyclid 10 mg/2 ml Injection.</td></tr>
</table>

PROPOFOL 1% & 2%

<table>
<tr><td>Brand name</td><td>Propofol Injectable Emulsion USP Hypro-Melt 1%</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus, IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Avoid rapid bolus administration to minimize hypotension.
▪ Emulsion transferred to a syringe should be done immediately after opening the vial and must be used within 12 hours from transfer.
▪ If two layers can be seen after shaking, the emulsion should not be used.</td></tr>
<tr><td>References</td><td>1. Celon Laboratories Ltd. Product Leaflet Propofol Injectable Emulsion USP Hypro-Melt 1%.
2. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].</td></tr>
</table>

PROTAMINE 50 MG/5 ML

<table>
<tr><td>Brand name</td><td>Protamine Sulphate</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 10 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ No more than 50 mg of protamine sulphate should be given in any one dose.
▪ Too rapid administration of protamine sulphate may cause severe hypotension and anaphylactic reactions.</td></tr>
<tr><td>References</td><td>1. Antah Pharma Sdn. Bhd. Product Leaflet Protamine Sulphate 10 mg/ml Solution for Injection. Revised 25 Oct 2013.</td></tr>
</table>

3 FACTORS PROTHROMBIN COMPLEX CONCENTRATE 500 IU (FACTOR II, IX & X)

<table>
<tr><td>Brand name</td><td>Prothrombinex</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 20 ml solvent given</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse at rate of 3 ml/min</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>-</td><td>Use immediately</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Allow the vials of Prothrombinex and solvent to reach temperature 20-30°C before reconstituting.</td></tr>
<tr><td>References</td><td>1. CSL Behring Australia Pty Ltd. Product Leaflet Prothrombinex. Revised 5 Mar 2015.</td></tr>
</table>

4 FACTORS PROTHROMBIN COMPLEX CONCENTRATE (FACTOR II, VII, IX & X AND PROTEIN C & S)

<table>
<tr><td>Brand name</td><td>Octaplex</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 20 ml solvent provided</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Initially 1ml/min, then not faster than 2 – 3ml per minute</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>8 hours</td><td>8 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ If the powder fails to dissolve completely or an aggregate is formed, do not use the preparation.</td></tr>
<tr><td>References</td><td>1. OctapharmaPharmazeutika. Product Leaflet Octaplex. Revised 22 May 2018.</td></tr>
</table>

RASBURICASE 1.5 MG

<table>
<tr><td>Brand name</td><td>Rasburnat
Elitek</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute 1.5 mg with 1 ml solvent provided.
Mix gently. Do not shake or vortex.</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 0.2 mg/kg in 50 ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>Use within 3 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Infuse through a separate line or flush IV line with at least 15 ml saline prior to and following rasburicase infusion.
▪ Discard reconstituted solution if particulate matter is visible or product is discolored.
▪ Do not use filters during reconstitution or infusion.</td></tr>
<tr><td>References</td><td>1. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
2. Sanofi-Aventis. Rasburicase Product Leaflet. Revised Oct 2009.</td></tr>
</table>

REMIFENTANIL 5 MG/10 ML

<table>
<tr><td>Brand name</td><td>Ultiva</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 0.4 mg/ml (10 mg in 25 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over at least 30 seconds
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. GlaxoSmithKline. Remifentanil (ULTIVA®) Product Leaflet. Revised 15 Mar 2021.
2. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
3. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
</td></tr>
</table>

ROCURONIUM 25 MG/2.5 ML & 50 MG/5 ML

<table>
<tr><td>Brand name</td><td>Rocuronium Kabi</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer rapidly
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ IV infusion can be further diluted to concentration of 0.1 to 5 mg/ml with D5 or NS if required.</td></tr>
<tr><td>References</td><td>1. Fresenius Kabi. Rocuronium Kabi Product Leaflet. Revised Jun 2021.
2. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
3. Medscape. Version 1124.0. WebMD, LLC. [cited 2023 Apr 18].
4. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].</td></tr>
</table>

SALBUTAMOL 0.5 MG/1 ML

<table>
<tr><td>Brand name</td><td>YSP Salbutamol</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: Maximum concentration of 0.05 mg/ml
IV infusion: Maximum concentration of 0.2 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer slowly
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
2. Y.S.P Industries (M). Salbutamol Product Leaflet. Revised 16 Jun 2017.</td></tr>
</table>

SODIUM BICARBONATE 8.4% W/V 10 ML
(CONTAINS 10 MMOL BICARBONATE & 10 MMOL SODIUM)

<table>
<tr><td>Brand name</td><td>DB Sodium Bicarbonate</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer slowly
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administration with catecholamines in the same IV catheter will result in inactivation of catecholamines.</td></tr>
<tr><td>References</td><td>
1. Duopharma (M) Sdn. Bhd. DB Sodium Bicarbonate 8.4% w/v Injection Product Leaflet. Revised 26 Aug 2019.
2. McAuley D. Sodium Bicarbonate [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/zofran-ondansetron/
3. Medscape. Version 1124.0. WebMD, LLC. [cited 2023 Apr 18].
4. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
</td></tr>
</table>

SODIUM GLYCEROPHOSPHATE 20 ML
(CONTAINS 20 MMOL PHOSPHATE & 40 MMOL SODIUM)

<table>
<tr><td>Brand name</td><td>Glycophos</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 20 mmol phosphate in 100 ml
Central: Maximum concentration of 20 mmol phosphate in 50 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse no faster than 7.5 mmol phosphate per hour (recommended 4 – 6 hours)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Fresenius Kabi. Glycophos Product Leaflet. Revised 3 Dec 2019.
2. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
3. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
</td></tr>
</table>

SODIUM NITROPRUSSIDE 50 MG/2 ML

<table>
<tr><td>Brand name</td><td>Nipride</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration 1 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Product should always be protected from light, even during administration.</td></tr>
<tr><td>References</td><td>

1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
2. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18]. (Retrieved from missing)
3. Medscape. Version 1124.0. WebMD, LLC. [cited 2023 Apr 18].
4. Pfizer. Sodium Nitroprusside Product Leaflet. Revised 27 Jul 2017.
5. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/nitroprusside-drug-information

</td></tr>
</table>

SODIUM VALPROATE 400 MG

<table>
<tr><td>Brand name</td><td>Epilim</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with solvent (4 ml) provided</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Dilute prescribed dose with 50 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes
IV infusion: Infuse over 1 hour (maximum rate of 20 mg/min)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Rapid infusion is associated with increased risk of adverse events, but reported to be well-tolerated in limited studies.</td></tr>
<tr><td>References</td><td>
1. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
2. Medscape. Version 1124.0. WebMD, LLC. [cited 2023 Apr 18].
3. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
4. Sanofi-Aventis. Sodium Valproate (Epilim) Product Leaflet. Revised May 2020.
5. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/valproate-chloride-drug-information.
</td></tr>
</table>

STREPTOKINASE 1,500,000 IU

<table>
<tr><td>Brand name</td><td>Streptokinase Karma 1,500,000
Streptase
Streptokinase Biofactor</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 5 ml NS or WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 30,000 IU/ml (1,500,000 IU in 50 ml)</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>Myocardial infarction: 1.5 MU over 1 hour
Pulmonary embolism, deep vein thrombosis: 250,000 IU over 30 minutes, then 100,000 IU/hour for 24 hours (72 hours for DVT)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>12 hours (Biofactor)
24 hours (Streptokinase Karma & Streptase)</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Solution should be swirled gently to facilitate quick reconstitution, avoid shaking to avoid foaming.
▪ Stability of diluted solution is brand specific.</td></tr>
<tr><td>References</td><td>1. Biofactor GmbH. Streptokinase Product Leaflet. Revised Jul 2009.
2. CSL Behring Canada Inc. Streptase® Product Leaflet. Revised 23 Feb 2007.
3. Karma Pharmatech GmbH. Streptokinase Karma Product Leaflet. Revised Dec 2020.</td></tr>
</table>

STREPTOMYCIN 1 G

<table>
<tr><td>Brand name</td><td>Streptin</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with NS or WFI;
3.5 ml (250 mg/ml)
4.5 ml (200 mg/ml)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IM: No further dilution required
IV infusion: Dilute prescribed dose in 100 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM
IV infusion: Infuse over 30 – 60 minutes (off label route)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].</td></tr>
</table>

SUGAMMADEX 200 MG/2 ML

<table>
<tr><td>Brand name</td><td>Bridion</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 10 seconds</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Flush the infusion line with NS between administration of sugammadex and other medicinal agents.
▪ Some experts suggest administering slow IV push to reduce incidence of serious adverse events.</td></tr>
<tr><td>References</td><td>1. Merck Sharp & Dohme (M) Sdn Bhd. Sugammadex Sodium (Bridion) Injection Product Leaflet. Revised May 2020.
2. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].</td></tr>
</table>

SUXAMETHONIUM CHLORIDE 100 MG/2 ML

<table>
<tr><td>Brand name</td><td>Scolax</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 10 – 30 seconds</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Incompatible with alkaline solutions.</td></tr>
<tr><td>References</td><td>
1. Chandra Bhagat Pharma Ltd. Product Leaflet Scolax® Injection 50 mg/ml.
2. Medscape. Version 1124.0. WebMD, LLC. [cited 2023 Apr 18].
3. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
4. Patricia Dwyer Schull. Mcgraw-Hill’s I.V. drug handbook. New York Mcgraw Hill Professional; 2009.
</td></tr>
</table>

TENECTEPLASE 50 MG (10,000 UNITS)

<table>
<tr><td>Brand name</td><td>Metalyse</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with provided solvent 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 5 – 10 seconds</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Reconstitution</td><td>24 hours</td><td>8 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Incompatible with dextrose.</td></tr>
<tr><td>References</td><td>1. Boehringer Ingelheim Pharma GmbH & Co. KG. Product Leaftlet Metalyse® Powder and Solvent for Solution for Injection. Revised 7 Feb 2014.</td></tr>
</table>

TERLIPRESSIN 1 MG/8.5 ML

<table>
<tr><td>Brand name</td><td>Glypressin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over 3 – 5 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Injection must be given intravenously to avoid local necrosis at the injection site.</td></tr>
<tr><td>References</td><td>1. Nottingham University Hospital. Critical Care Pharmacy Drug Guidelines Folder. Jan 2019.
2. Zentiva. Product Leaflet Glypressin® 1 mg/8.5 ml Solution for Injection. Revised Jan 2019.</td></tr>
</table>

TETANUS IMMUNOGLOBULIN (HUMAN) 250 IU/1 ML

<table>
<tr><td>Brand name</td><td>Sero-Tet</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Should not be administered intravenously.</td></tr>
<tr><td>References</td><td>1. Green Cross Corp. Product Insert Sero-Tet Injection.</td></tr>
</table>

THIAMINE HYDROCHLORIDE 100 MG/1 ML & 200 MG/2 ML

<table>
<tr><td>Brand name</td><td>Benerva
Thiamin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IM, IV bolus: No further dilution required
IV infusion: Prescribed dose in 50 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer over 5 – 10 minutes
IV infusion: Infuse over 15 – 30 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Protect from light.
▪ An extended infusion time over 15 – 30 minutes is suggested for doses ≥ 100 mg.</td></tr>
<tr><td>References</td><td>
1. Exeltis Rethinking Healthcare. Thiamin ® Product Leaftlet.
2. Joint Formulary Committee. BNF 83 (British National Formulary) March 2022. S.L.: Pharmaceutical Press; 2022.
3. Lexi-Comp Inc. Version 6.4.0. Lexi-Drug©. [cited 2023 Apr 18].
4. McAuley D. Thiamine [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/thiamine/
5. Patricia Dwyer Schull. Mcgraw-Hill’s I.V. drug handbook. New York Mcgraw Hill Professional; 2009.
6. Young P, Psirides A. Intensive Care Drug Manual. 2nd ed. Wellington Regional Hospital; 2013.
</td></tr>
</table>

THIOPENTAL SODIUM 500 MG

<table>
<tr><td>Brand name</td><td>Pentotex</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with diluent</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: Maximum concentration of 50 mg/ml
IV infusion: Maximum concentration of 4 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over at least 30 seconds
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administer centrally, as high pH of thiopental sodium can cause peripheral vein irritancy.</td></tr>
<tr><td>References</td><td>
1. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
2. McAuley D. Thiopental – Pentothal ® [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/thiopental/
3. Nottingham University Hospital. Critical Care Pharmacy Drug Guidelines Folder. Jan 2019.
4. Pharmaforte Malaysia. Product Leaflet Pentotex Injection 0.5g. Revised Oct 2018.
5. Young P, Psirides A. Intensive Care Drug Manual. 2nd ed. Wellington Regional Hospital; 2013.
</td></tr>
</table>

TIGECYCLINE 50 MG

<table>
<tr><td>Brand name</td><td>Tygacil</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 5.3 ml NS (10 mg/ml)</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 1 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 30 – 60 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>48 hours (if kept in IV bag)</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Flush IV line before and after tigecycline administration.</td></tr>
<tr><td>References</td><td>
1. McAuley D. Tigecycline – Tygacil ® [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/tigecycline-tygacil/
2. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
3. Pfizer. Product Leaflet Tygacil 50mg. Revised Sept 2013.
</td></tr>
</table>

TOCILIZUMAB 80 MG/4 ML & 400 MG/20 ML

<table>
<tr><td>Brand name</td><td>Actemra</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>< 30 kg: Dilute to 50 ml
≥ 30 kg: Dilute to 100 ml</td></tr>
<tr><td>Diluent</td><td>NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 1 hour</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Chungai Pharma Manufacturing Co. Ltd.
2. Joint Formulary Committee. BNF 83 (British National Formulary) March 2022. S.L.: Pharmaceutical Press; 2022.
3. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
4. Product Leaftlet Actemra® Concentrate Solution for Infusion.
</td></tr>
</table>

TRAMADOL HYDROCHLORIDE 50 MG/1 ML

<table>
<tr><td>Brand name</td><td>Acugesic</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IM
IV bolus: Administer over at least 2 – 3 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. Duopharma (M) Sdn. Bhd. Product Leaftlet Tramadol Hydrochloride. Revised 18 Apr 2019.
2. Gray AH. Injectable Drugs Guide. London: Pharmaceutical Press; 2011.
3. Young P, Psirides A. Intensive Care Drug Manual. 2nd ed. Wellington Regional Hospital; 2013.
</td></tr>
</table>

TRANEXAMIC ACID 500 MG/5 ML

<table>
<tr><td>Brand name</td><td>Tranexamic Acid</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse at rate not more than 100 mg/min (1 ml/min)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Administration faster than 1 ml/min may cause hypotension.
▪ May be further diluted in D5 or NS to a maximum concentration of 20 mg/ml (stable for 24 hours refrigerated or room temperature).</td></tr>
<tr><td>References</td><td>1. McAuley D. Tranexamic Acid [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/tranexamic-acid/
2. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
3. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/tranexamic-acid-drug-information.</td></tr>
</table>

TRIAMCINOLONE ACETONIDE 40 MG/ 1ML

<table>
<tr><td>Brand name</td><td>Sivkort</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>No further dilution required</td></tr>
<tr><td>Diluent</td><td>Not applicable</td></tr>
<tr><td>Administration</td><td>Deep IM
Intra-articular</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>1. Siu Guan Hem. Ind. Co. Ltd. Triamcinolone Acetonide 40 mg/Ml Sterile Suspension For Injection Product Leaftlet. Revised 2017.</td></tr>
</table>

UROKINASE 5,000 IU & 500,000 IU

<table>
<tr><td>Brand name</td><td>U-frag</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 2 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Further dilute reconstituted solution with 200 ml of compatible diluents</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ After administration, the infusion tubing should be flushed with NS or D5. This volume of fluid should be flushed through the entire tubing length.</td></tr>
<tr><td>References</td><td>1. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].</td></tr>
</table>

VANCOMYCIN 500 MG

<table>
<tr><td>Brand name</td><td>Vivocin</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 10 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Peripheral: Maximum concentration of 5 mg/ml
Central: Maximum concentration of 10 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over at least 60 minutes (not exceeding 10 mg/min)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>96 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Infusion-related events are related to both concentration and rate of administration of vancomycin. If infusion-related events occur, slow the infusion rate to over 1.5 – 2 hours and increase the dilution volume.</td></tr>
<tr><td>References</td><td>
1. Gland Pharma Ltd. Vivocin Product Leaflet. Revised 5 Sept 2019.
2. Graham-Clarke E. Minimum Infusion Volumes [Internet]. 4.4 ed. Vol. 4. United Kingdom Clinical Pharmacy Association; 2012. Available from: https://www.scottishintensivecare.org.uk/uploads/2014-07-24-19-56-30-MinimuminfusionvolumesinI-40262.pdf
3. McAuley D. Vancomycin [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/vancomycin/
4. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
5. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/vancomycin-drug-information.
</td></tr>
</table>

VASOPRESSIN 20 IU/1 ML

<table>
<tr><td>Brand name</td><td>Vasopressin</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 1 units/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Infusion through central line is recommended.</td></tr>
<tr><td>References</td><td>
1. McAuley D. Vasopressin – Pitressin ® [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/vasopressin-pitressin/
2. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
3. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/vasopressin-drug-information.
</td></tr>
</table>

VERAPAMIL 5 MG/2 ML

<table>
<tr><td>Brand name</td><td>Zypamil</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>IV bolus: No further dilution required
IV infusion: Maximum concentration of 0.5 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV bolus: Administer over at least 2 minutes
IV infusion: Titrate as per dose prescribed</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>-</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>References</td><td>
1. McAuley D. Verapamil [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/verapamil/
2. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
3. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/verapamil-drug-information.
</td></tr>
</table>

VORICONAZOLE 200 MG

<table>
<tr><td>Brand name</td><td>Vfend</td></tr>
<tr><td>Reconstitution</td><td>Reconstitute with 19 ml WFI</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Maximum concentration of 5 mg/ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over 1 – 2 hours (maximum rate of 3 mg/kg/hr)</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ Do not infuse concomitantly into the same line or cannula with other drug infusions.
▪ Do not infuse concomitantly even in separate lines or cannulas with concentrated electrolyte solutions or blood products.</td></tr>
<tr><td>References</td><td>1. Pfizer (M) Sdn. Bhd. Product Leaflet Voriconazole 200 mg. Revised 15 Nov 2017.
2. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/voriconazole-drug-information.</td></tr>
</table>

ZOLEDRONIC ACID 4 MG/5 ML

<table>
<tr><td>Brand name</td><td>Oledron</td></tr>
<tr><td>Reconstitution</td><td>Not required</td></tr>
<tr><td>Suggested minimum dilutions</td><td>Dilute prescribed dose with 100 ml</td></tr>
<tr><td>Diluent</td><td>D5, NS</td></tr>
<tr><td>Administration</td><td>IV infusion: Infuse over at least 15 minutes</td></tr>
<tr><td>Stability</td><td>
<table>
<tr><th></th><th>Fridge (2 – 8°C)</th><th>RT (< 25°C)</th></tr>
<tr><td>After Dilution</td><td>24 hours</td><td>24 hours</td></tr>
</table>
</td></tr>
<tr><td>Comments</td><td>▪ If refrigerated, allow solution to reach room temperature before administration.
▪ Flush IV line with 10 ml NS flush following infusion.
▪ Patients must be appropriately hydrated prior to treatment.</td></tr>
<tr><td>References</td><td>1. McAuley D. Zoledronic Acid [Internet]. GlobalRPH. 2017 [cited 2023 Apr 18]. Available from: https://globalrph.com/dilution/zoledronic-acid/
2. Micromedex Drug Reference. Version 4.0.0 (881) Merative US L.P. [cited 2023 Apr 18].
3. UpToDate [Internet]. www.uptodate.com. Wolters Kluwer; [cited 2023 Apr 18]. Available from: https://www.uptodate.com/contents/zoledronic-acid-drug-information.</td></tr>
</table>

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Pharmaceutical Services Programme
Ministry of Health (Malaysia)
Lot 36, Jalan Prof Diraja Ungku Aziz
46200 Petaling Jaya
Selangor, Malaysia.
Tel: 03-7841 3200
Website: pharmacy.gov.my