FOREWORD

The publication of the 8th edition of National Essential Medicines Formulary (NEMF) by the Essential Medicines and Technology Division (EMTD) is an important milestone in promoting rational use of medicine and sustainability of free essential medicines from all health centres in the country. The 8th edition of the Bhutan Essential Medicines Formulary has been developed following the changes in the National Essential Medicines List (NEML) 2016.

The formulary gives ready reference on the essential medicines supplied through the Department of Medical Supplies and Health Infrastructure (DMSHI). It will give clinicians and other health professionals a better understanding of the indications, the dosages, side effects, cautions and contraindications of the essential medicines. I urge all the clinicians and medical colleagues to adhere to them for the benefit of the patient and the country.

I hope this revised formulary will be of great use and informative. The Department of Medical Services is grateful to World Health Organization for funding the revision and publication of this edition.

(Dr. Pandup Tshering)
Director
Department of Medical Services
PREFACE

The first edition of the NEMF was published in the year 1994. Since then subsequent editions were brought out as per changes in the NEML and the current edition is based on the NEML, 2016. The revision has been made with the objective to keep pace with the advancement in medicine information and to meet the challenges of modern healthcare in Bhutan.

As in the previous editions, the medicines in NEMF, 2016 is arranged according to therapeutic groups. For each medicine, latest information on the uses, the dosage, side effects, cautions and contraindications are provided. Information under appendix including medicine interactions, protocol for malaria treatment, immunization schedule and emergency treatment of poisoning has also been updated. Further, the editors have adopted the World Health Organization (WHO) recommendation to replace the word "drug" with "medicine".

It is hoped that these changes and additions would provide the necessary information to all the health professionals inorder to provide better healthcare to all those who are in need.
ACKNOWLEDGEMENTS

The Essential Medicine and Technology Division (EMTD) is grateful to individuals and organisations that have provided advice and information to the National Essential Medicine Formulary and also to World Health Organization (WHO) for the financial assistance.

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Special thanks are also due to the Chairperson and the members of National Medicine Committee (NMC) for the review and endorsing the formulary.

The NEMF 2016 has been developed over a period of several years and with input of a large number of individuals whose help is also gratefully acknowledged.

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## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General guidance on prescribing</td>
<td>8</td>
</tr>
<tr>
<td>Variation in dose–response</td>
<td>9</td>
</tr>
<tr>
<td>Adherence with the medicine treatment</td>
<td>11</td>
</tr>
<tr>
<td>Adverse effects and interactions</td>
<td>12</td>
</tr>
<tr>
<td>Prescription writing</td>
<td>13</td>
</tr>
<tr>
<td>1. Antidotes and other substance use in poisoning</td>
<td>14</td>
</tr>
<tr>
<td>1.1 General</td>
<td>14</td>
</tr>
<tr>
<td>1.2 Specific</td>
<td>14</td>
</tr>
<tr>
<td>2. Anaesthetics</td>
<td>16</td>
</tr>
<tr>
<td>2.1. General anaesthetics</td>
<td>16</td>
</tr>
<tr>
<td>2.2. Local anaesthetics</td>
<td>19</td>
</tr>
<tr>
<td>3. Analgesics, antipyretics, NSAIDs and medicines used to treat gout</td>
<td>21</td>
</tr>
<tr>
<td>3.1 Non-opioids</td>
<td>21</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>21</td>
</tr>
<tr>
<td>3.2 Opioid analgesics</td>
<td>23</td>
</tr>
<tr>
<td>3.3 Antigout medicines</td>
<td>25</td>
</tr>
<tr>
<td>4. Disease Modifying Anti-Rheumatic Medicines (DMARMs)</td>
<td>26</td>
</tr>
<tr>
<td>5. Anti-allergies and medicines used in anaphylaxis</td>
<td>27</td>
</tr>
<tr>
<td>6. Medicines for Meniere’s disease</td>
<td>30</td>
</tr>
<tr>
<td>7. Antimigraine medicines</td>
<td>30</td>
</tr>
<tr>
<td>7.1. Treatment of acute attack</td>
<td>30</td>
</tr>
<tr>
<td>7.2. Prophylaxis</td>
<td>31</td>
</tr>
<tr>
<td>8. Antiepileptics</td>
<td>31</td>
</tr>
<tr>
<td>9. Antiparkinson medicines</td>
<td>35</td>
</tr>
<tr>
<td>10. Muscle relaxants and anticholinesterase inhibitors</td>
<td>36</td>
</tr>
<tr>
<td>10.1. Centrally acting</td>
<td>36</td>
</tr>
<tr>
<td>10.2. Peripherally acting</td>
<td>37</td>
</tr>
<tr>
<td>10.2.1. Non-depolarising muscle relaxant</td>
<td>37</td>
</tr>
<tr>
<td>10.2.2 Depolarising muscle relaxant</td>
<td>38</td>
</tr>
<tr>
<td>10.3 Cholinesterase inhibitors</td>
<td>38</td>
</tr>
<tr>
<td>11. Psychotherapeutic medicines</td>
<td>38</td>
</tr>
<tr>
<td>11.1 Medicines used in psychotic disorders</td>
<td>38</td>
</tr>
<tr>
<td>11.2 Medicines used in mood disorder</td>
<td>42</td>
</tr>
<tr>
<td>11.3 Anxiolytics</td>
<td>43</td>
</tr>
<tr>
<td>12. Anti-infective medicines</td>
<td>44</td>
</tr>
<tr>
<td>12.1. Anthelmintics</td>
<td>44</td>
</tr>
<tr>
<td>12.2. Antibacterials</td>
<td>45</td>
</tr>
<tr>
<td>12.2.1 Penicillin</td>
<td>45</td>
</tr>
<tr>
<td>12.2.2 Cephalosporins</td>
<td>48</td>
</tr>
<tr>
<td>12.2.3 Aminoglycosides</td>
<td>49</td>
</tr>
<tr>
<td>12.2.4 Fluoroquinolones</td>
<td>50</td>
</tr>
<tr>
<td>12.2.5 Other antibacterial</td>
<td>51</td>
</tr>
<tr>
<td>12.2.3 Antileprosy medicines</td>
<td>54</td>
</tr>
<tr>
<td>12.2.4. Antituberculosis medicines</td>
<td>55</td>
</tr>
<tr>
<td>12.3 Antifungal medicines</td>
<td>60</td>
</tr>
<tr>
<td>12.4. Antiprotozoal medicines</td>
<td>61</td>
</tr>
<tr>
<td>12.4.1 Antiamoebic and antigiardiasis medicines</td>
<td>61</td>
</tr>
<tr>
<td>13.4.2 Antimalarial medicines</td>
<td>62</td>
</tr>
<tr>
<td>12.5 Antiviral medicines</td>
<td>64</td>
</tr>
<tr>
<td>12.5.1 Anthervespes</td>
<td>64</td>
</tr>
<tr>
<td>12.5.2 Medicines for hepatitis B infection</td>
<td>65</td>
</tr>
<tr>
<td>12.5.3. Antiretroviral Medicines</td>
<td>65</td>
</tr>
<tr>
<td>13. Antineoplastic and Immunosuppressive medicines</td>
<td>68</td>
</tr>
<tr>
<td>13.1 Immunosuppressant</td>
<td>68</td>
</tr>
</tbody>
</table>
13.2 Cytotoxic medicines 70
14. Medicines affecting the blood 72
14.1. Antianaemia medicines 72
14.2. Medicines affecting coagulation 73
15. Blood products and plasma substitute 75
16. Cardiovascular medicines 76
16.1. Antianginal medicines 76
16.2. Antiarrhythmic medicines 79
16.3. Antihypertensive medicines 82
16.4 Medicines used in heart failure 86
16.5 Antiplatelet agents 88
16.6. Lipid regulating medicines 89
16.7. Peripheral vasodilator 90
17. Medicines acting on the respiratory tract 90
17.1 Bronchodilators and inhaled corticosteroids 90
17.2 Antitussives and decongestants 93
17.2.1 Antitussives 93
17.2.2 Decongestants 93
18. Gastrointestinal Medicines 93
18.1 Medicines for dyspepsia and ulcer 93
18.1.1 Antacids 93
18.1.2. H2 receptor antagonists 94
18.1.3 Proton Pump Inhibitors 94
18.1.4. Antiemetic 95
18.2. Antihemorrhoidal medicines 96
18.3. Antispasmodic medicines 96
18.4. Laxatives 97
18.5. Medicines used in diarrhoea 98
18.5.1. Oral Rehydration 98
18.5.2 Antimotility 98
19. Diuretics 99
19.1 Osmotic diuretic 99
19.2 Thiazide Diuretic 99
19.3 Loop Diuretic 99
19.4 Potassium sparing diuretic 99
20. Genitourinary medicines 99
20.1 Medicines for urinary incontinence 99
20.2 Medicines for Benign Prostatic Hypertrophy 100
21. Hormones, other endocrine medicines and contraceptives 101
21.1 Adrenal hormones & synthetic substitutes 101
21.2. Ovulation inducers 102
21.3 Contraceptives 103
21.3.1 Hormonal contraceptives 103
21.4 Oestrogens 105
21.5 Progestogens 105
21.6 Insulin & other antidiabetic agents 106
21.7 Thyroid hormones and antithyroid medicines 108
21.7.1 Thyroid hormones 108
21.7.2 Antithyroid medicines 108
21.8 Medicines used in calcium metabolism 109
22. Medicines used in obstetrics 109
22.1 Oxytocic 110
22.2 Antioxytocic 111
23. Ophthalmological Preparations 112
23.1 Anti-infective agents 112
23.2 Anti-inflammatory Agents 114
23.3 Antiglaucoma medicines 114
   23.3.1 Miotic 114
   23.3.2 Beta-blockers 114
   23.3.3 Carbonic anhydrase inhibitors 115
   23.3.4 Cholinergics 115
23.4 Mydriatic and cyclopegics 116
23.5 Miscellaneous 117
24. Dermatological Medicines 118
   24.1. Antifungal medicines (topical) 118
   24.2 Antibacterial medicines (topical) 119
   24.3 Antiviral Medicines 119
   24.4 Antiinflammatory and antipruritic medicines 119
   24.5 Keratoplastic and keratolytic agents 121
   24.6. Scabicides and pediculosides 122
   24.7 Local anaesthetics (topical) 122
   24.8 Rubefacients 123
   24.9 Medicines for vitiligo 123
   24.10 Miscellaneous 123
25. Immunological and vaccines 123
   25.1 Sera and immunoglobulin 123
   25.2 Vaccines 125
      25.2.1 For universal immunization 125
      25.2.2 For specific group of individuals 126
26. Vitamins & Minerals 127
   26.1 Vitamins 127
   26.2 Minerals 129
27. Solution for water, electrolytes & acid-base disturbances 130
   27.1. Oral 130
   27.2 Parenteral 131
28. Parenteral nutrition 132
29. Diagnostic agents 133
   29.1 Ophthalmic medicines 133
   29.2 Radio-contrast Media 133
Appendix 1: Interactions 135
Appendix 2: Malaria Treatment Regimen 153
   Treatment regimen for P. vivax: Protocol A 153
   Treatment regimen for uncomplicated falciparum malaria: Protocol B 154
Antimalarial medicines for the treatment of severe malaria: Protocol C 156
Appendix 3: Immunization schedule 158
Appendix 4: Emergency treatment of poisoning (specific medicines) 161
Appendix 5: Equivalent analgesic dose 168
Appendix 6: Compounding formulae 169
   Part A: External preparations 169
   Part B: Internal preparations 174
Appendix 7: Medicines in pregnancy and lactation 181
Appendix 8: Renal Impairment 200
Appendix 9: Hepatic Impairment 206
Index 210
General guidance on prescribing

Medicines should only be prescribed when they are necessary, and in all cases the benefit of administering the medicine should be considered in relation to the risk involved. Bad prescribing habits lead to ineffective and unsafe treatment, prolongation of illness, distress and harm to the patient, and higher cost.

Rational approach to therapeutics:

1. Define the patient's problem
   Whenever possible, making the right diagnosis is based on integrating many pieces of information: the complaint as described by the patient; a detailed history; physical examination; laboratory tests; and X-rays and other investigations. This will help in rational prescribing, always bearing in mind that diseases are evolutionary processes.

2. Specify the therapeutic objective
   Clinicians must clearly state their therapeutic objectives based on the pathophysiology underlying the clinical situation. Very often physicians must select more than one therapeutic goal for each patient.

3. Select the therapeutic strategies
   The selected strategy should be agreed with the patient; this agreement on outcome, and how it may be achieved, is termed concordance. The selected treatment can be non-pharmacological and/or pharmacological; it also needs to take into account the total cost of all therapeutic options.

   a. Non-pharmacological treatment
      It is very important to bear in mind that the patient does not always need a medicine for treatment of their condition. Very often, health problems can be resolved by a change in lifestyle or diet, use of physiotherapy or exercise, provision of adequate psychological support, and other non-pharmacological treatments; these have the same importance as a prescription medicines, and instructions for such treatments must be written, explained, and monitored in the same way.

   b. Pharmacological treatment
      Selecting the correct group of medicines: Knowledge about the pathophysiology involved in the clinical situation of each patient and the pharmacodynamics of the chosen group of medicines, are the two fundamental principles for rational therapeutics.

      Selecting the medicine from the chosen group: The selection process must consider benefit/risk/cost information. This step is based on evidence about maximal clinical benefits of the medicine for a given indication (efficacy) with the minimum production of adverse effects (safety). It must be remembered that each medicine has adverse effects and it is estimated that up to 10% of hospital admissions in industrialized countries are due to adverse effects. Not all medicine-induced injury can be prevented but much of it is caused by inappropriate selection of medicines. In cost comparisons between medicines, the cost of the total treatment and not only the unit cost of the medicine must be considered.

      Verifying the suitability of the chosen pharmaceutical treatment for each patient: The prescriber must check whether the active substance chosen, its dosage form, standard dosage schedule, and standard duration of treatment are suitable for each patient. Medicine treatment should be individualized to the needs of each patient.
Prescription writing: As the prescription is the link between the prescriber, the pharmacist (or dispenser), and the patient, it is vital to the successful management of the presenting medical condition.

Giving information, instructions, and warnings: This step is important to ensure patient adherence and is covered in detail in a following section with medicine treatment).

Monitoring treatment: Evaluation of the follow-up and the outcome of treatment allows the stopping of it (if the patient’s problem is solved) or its reformulation it when necessary. This step gives rise to important information about the effects of medicines, contributing to the building up of the body of knowledge of pharmacovigilance, which is needed to promote the rational use of medicines.

Variation in dose–response
Success in medicine treatment depends not only on the correct choice of medicine but on the correct dose regimen. Unfortunately, medicine treatment frequently fails because the dose is too small or produces adverse effects because it is too large. The concept of a standard or “average” adult dose for every medicine is firmly rooted in the mind of most prescribers. After the initial “dose ranging” studies on new drugs, manufacturers recommend a dosage that appears to produce the desired response in the majority of subjects. These studies are usually done on healthy, young male Caucasian volunteers, rather than on older men and women with illnesses and of different ethnic and environmental backgrounds. The use of standard doses in the marketing literature suggests that standard responses are the rule, but in reality there is considerable variation in medicine response. There are many reasons for this variation which include adherence, medicine formulation, body weight and age, composition, variation in medicine absorption, distribution, metabolism, and excretion, variation in pharmacodynamics, disease variables, and genetic and environmental variables.

Medicine formulation: Enteric-coated medicines have been known to pass through the gastrointestinal tract intact. In medicines with a narrow therapeutic to toxic ratio, changes in absorption can produce sudden changes in medicine concentration.

Body weight and age: Although the concept of varying the dose with the body weight or age of children has a long tradition, adult doses have been assumed to be the same irrespective of size or shape. Yet adult weights vary 2- to 3-fold, while a patient with a large fat mass can store large excesses of highly lipid soluble medicines compared with a lean patient of the same weight. Age changes can also be important. Adolescents may oxidize some medicines relatively more rapidly than adults, while the elderly may have reduced renal function and eliminate some medicines more slowly.

Dose calculation in children: Children’s doses may be calculated from adult doses by using age, body weight, or body surface area, or by a combination of these factors.

Body weight may be used to calculate doses expressed in mg/kg. Young children may require a higher dose per kilogram than adults because of their higher metabolic rates. Other problems need to be considered. For example, calculation by body weight in an overweight child may result in much higher doses being administered than necessary; in such cases, dose should be calculated from an ideal weight, related to height and age.
Body Surface Area (BSA) estimates are more accurate for calculation of pediatric doses than body weight because many physiological phenomena correlate better with body surface area. The average body surface area of a 70kg human is about 1.8m². Thus, to calculate the dose for a child the following formula may be needed:

\[ \text{Approximate dose for patient} = \frac{\text{Surface area of child (m}^2\text{)}}{1.8} \times \text{adult dose} \]

Where the dose for children is not readily available, prescribers should seek specialist advice before prescribing for a child.

<table>
<thead>
<tr>
<th>Age</th>
<th>Weight Kg</th>
<th>Weight Lb</th>
<th>Height Cm</th>
<th>Height Inch</th>
<th>Body surface area (m²)</th>
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<tr>
<td>New born</td>
<td>3.5</td>
<td>7.7</td>
<td>50</td>
<td>20</td>
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<tr>
<td>1 month</td>
<td>4.2</td>
<td>9.3</td>
<td>55</td>
<td>22</td>
<td>0.26</td>
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<tr>
<td>2 month</td>
<td>5.5</td>
<td>12.1</td>
<td>59</td>
<td>23</td>
<td>0.32</td>
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<tr>
<td>6 month</td>
<td>7.7</td>
<td>17.0</td>
<td>67</td>
<td>26</td>
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<tr>
<td>1 year</td>
<td>10.0</td>
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<tr>
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<td>86.0</td>
<td>143</td>
<td>58</td>
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<th>Age</th>
<th>Weight Kg</th>
<th>Weight Lb</th>
<th>Height Cm</th>
<th>Height Inch</th>
<th>Body surface area (m²)</th>
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<td>173</td>
<td>68</td>
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<td>56</td>
<td>123</td>
<td>163</td>
<td>64</td>
<td>1.6</td>
</tr>
</tbody>
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Physiological and pharmacokinetic variables: Medicine absorption rates may vary widely between individuals and in the same individual at different times and in different physiological states. Medicines taken after a meal are delivered to the small intestine much more slowly than in the fasting state, leading to much lower medicine concentrations. In pregnancy gastric emptying is also delayed, while some medicines may increase or decrease gastric emptying and affect absorption of other medicines.

Medicine distribution: Medicine distribution varies widely: fat-soluble medicines are stored in adipose tissue, water-soluble medicines are distributed chiefly in the extracellular space, acidic medicines bind strongly to plasma albumin, and basic drugs to muscle cells. Hence variation in plasma albumin concentration, fat content or muscle mass may all contribute to dose variation. With very highly albumin-bound medicines like warfarin, a small change of albumin concentration can produce a big change in free medicine and a dramatic change in medicine effect.

Medicine metabolism and excretion: Medicine metabolism is affected by genetic, environmental, and disease-state factors. Medicine acetylation shows genetic polymorphism, whereby individuals fall clearly into either fast or slow acetylator types. Medicine oxidation, however, is polygenic, and although a small proportion of the population can be classified as very slow oxidizers of some medicines, for most medicines and most subjects there is a normal distribution of medicine metabolizing capacity.
Many medicines are eliminated by the kidneys without being metabolized. Renal disease or toxicity of other medicines on the kidney can therefore slow excretion of some medicines.

**Pharmacodynamic variables:** There is significant variation in receptor response to some medicines, especially central nervous system responses, for example pain and sedation. This can be because of genetic factors, tolerance, medicine interactions, and medicine dependence.

**Disease variables:** Both liver disease and kidney disease can have major effects on medicine response, chiefly through the effect on metabolism and elimination, respectively (increasing toxicity), but also through their effect on plasma albumin (increasing free drug and thus toxicity). Heart failure can also affect metabolism of drugs with rapid hepatic clearance (for example lignocaine, propranolol). Respiratory disease and hypothyroidism can impair medicine oxidation.

**Environmental variables:** Many medicines and environmental toxins can induce the hepatic microsomal enzyme oxidizing system or cytochrome P450 oxygenases, leading to more rapid metabolism and elimination, and thus less effective treatment. Environmental pollutants, anaesthetic medicines, and other compounds such as pesticides can also induce metabolism. Diet and nutritional status also affect pharmacokinetics. For example, in infantile malnutrition and in malnourished elderly populations medicine oxidation rates are decreased, while high protein diets, charcoal cooked foods, and certain other foods act as metabolizing enzyme inducers. Chronic alcohol use induces oxidation of other medicines, but in the presence of high circulating alcohol concentrations, medicine metabolism may be inhibited.

**Adherence with the medicine treatment**

It is often assumed that once the appropriate medicine is chosen, the prescription correctly written, and the medication correctly dispensed, that it will be taken correctly and treatment will be successful. Unfortunately, this is very often not the case, and physicians overlook one of the most important reasons for treatment failure – poor adherence (compliance) with the treatment plan.

Difficulties in compliance with medicine treatment occur regardless of age. Factors contributing to poor compliance with prescribed medicines include:

- Prescription not collected or not dispensed;
- Purpose of medicine not clear;
- Perceived lack of efficacy;
- Real or perceived side effects;
- Patients’ perception of the risk and severity of adverse effects may differ from that of the prescriber;
- Instruction for administration not clear;
- Physical difficulty in taking medicines (e.g. with swallowing the medicines);
- Unattractive formulation (e.g. unpleasant taste); and
- Complicated regimen.

The prescriber and the patient should agree on the health outcomes that the patient desires and on the strategy for achieving them (‘concordance’).

Taking the time to explain to the patient (and relatives) the rationale and the potential adverse effects of treatment may improve adherence. Reinforcement and elaboration of the physician’s instructions by the pharmacist and other
members of the healthcare team also helps. Advising the patient of the possibility of alternative treatments may encourage the patient to seek advice rather than merely abandon unacceptable treatment.

Simplifying the medicine regimen may help; the need for frequent administration may reduce adherence, although there appears to be little difference in adherence between once-daily and twice-daily administration.

**Adverse effects and interactions**

**Adverse reactions to medicines:** An adverse reaction to medicines may be defined as "any response to a medicine which is noxious, unintended and occurs at doses normally used for prophylaxis, diagnosis, or therapy. Adverse reactions are therefore unwanted or unintended effects of a medicine, which occur during its proper use. They differ from accidental or deliberate excessive dosage or administration.

Adverse reactions may be directly linked to the properties of the medicine in use, known as “A” type reactions. E.g. hypoglycaemia caused by antidiabetic medicines. Adverse reactions may also be unrelated to the known pharmacology of the medicine, known as “B” type reactions. e.g. anaphylaxis with penicillin.

**Major factors predisposing to adverse effects are:**

**Extremes of age:** The very young and very old are more susceptible to adverse reactions. For e.g. medicines commonly causing problems in elderly are hypnotics, diuretics, NSAIDs, antihypertensives, psychotropics and digoxin.

All children, and particularly neonates, differ from adults in their response to medicines. Some medicines are likely to cause problems in neonates (e.g. morphine), but are generally tolerated in children. Other medicines (e.g. valproic acid) are associated with increased risk of adverse reactions in children of all ages. Other medicines associated with problems in children include chloramphenicol (grey baby syndrome), antiarrhythmics (worsening of arrhythmias), and acetylsalicylic acid (Reye’s syndrome).

**Inter current illness:** Besides the condition being treated, if the patient is suffering from another disease such as liver, kidney or heart disease, special precautions may be necessary to prevent adverse reactions.

**Medicine interactions** (appendix 1): It is one of the commonest causes of adverse reactions to medicines. It may occur between medicines which compete for the same receptor or which act on the same physiological system. They may also occur indirectly when a medicine-induced disease or a change in fluid or electrolyte balance alters the response to another medicine. In addition, interactions may occur when one medicine alters the absorption, distribution or elimination of another medicine, such that the amount which reaches the site of action is increased or decreased.

Medicine-medicine interactions are some of the commonest causes of adverse effects. When two medicines are administered to a patient, they may either act independently of each other, or interact with each other. Interaction may increase or decrease the effects of the medicines concerned and may cause unexpected toxicity. As newer and more potent medicines become available, the number of serious medicine interactions is likely to increase. Remember that interactions which modify the effects of a drug may involve non-prescription medicines, non-medicinal chemical agents, and social drugs such as alcohol, marijuana, tobacco, and traditional remedies, as well as certain types of food for example, grapefruit juice. The physiological changes in individual patients, caused by such
factors as age and gender, also influence the predisposition to adverse reactions to medicines resulting from medicine interactions.

**Incompatibilities between medicines and Intravenous fluids:** Medicines should not be added to blood, amino acid solutions or fat emulsions. Certain medicines, when added to intravenous fluids, may be inactivated by pH changes, by precipitation or by chemical reaction. Benzylpenicillin and ampicillin lose potency after 6-8 hours if added to dextrose solutions, due to the acidity of these solutions. Some medicines bind to plastic containers and tubing, for example diazepam and insulin. Amino glycosides are incompatible with penicillin and heparin. Hydrocortisone is incompatible with heparin, tetracycline, and chloramphenicol.

**Note:** Please report any adverse reactions to medicines by filling up the ADR reporting forms and sending it to the Pharmacy Department, JDWNRH or to the Drug Regulatory Authority. The forms may be downloaded from the website: www.dra.gov.bt

**PRESCRIPTION WRITING**

Prescriptions should be:

- Written legibly in ink
- Should be dated
- Should state the full name, address, age and gender of the patient
- Should state the name of the medicine in generics with route, dose and frequency, except for syrups and combination medicines.
- Should be signed in ink by the prescriber along with their name and BHMC registration number. It is recommended that they use their seal if they have one.

**CONVERSION TABLE**

| 1 kg       | = 1000 mg          |
| 1 mg       | = 1000 mcg         |
| 1 mcg      | = 0.000001 kg      |
| 1 litre    | = 1000 ml or cc    |
| 1% w/v     | = 1g solid/medicine dissolved 100 ml of solution |
| 1% v/v     | = 1 ml liquid in 100 ml solution |
| 1% w/w     | = 1g solid/medicine in 100g of ointment |
1. Antidotes and other substance use in poisoning

1.1 General

CHARCOAL

Activated powder, 450g

Therapeutic group general antidote

Indications to bind poisons in the stomach to prevent absorption; to enhance elimination of some medicines after absorption

Contraindications poisoning by corrosive substances (strong acid or alkali); concurrent administration with specific oral antidotes or oral emetics

Cautions drowsy or comatose patient (risk of aspiration); reduced GI motility (risk of obstruction); not for poisoning with petroleum distillates, corrosive substances, alcohols, clofenotane (dicophane, DDT), malathion, and metal salts including iron and lithium salts; ensure adequate fluid intake after administration if poison has diuretic properties

Side effects vomiting, constipation or diarrhoea; black stool

Dose binding poisons (particularly useful to prevent absorption of highly toxic poisons): by oral administration, ADULT, 50-100g; CHILD 1-2yrs, 25-50g; INFANT: 1g/kg (approx 5ml/kg) as single dose; active elimination (To enhance elimination of aspirin, carbamazepine, dapson, digoxin, phenytoin, phenobarbitone & aminophylline): ADULT, 50g then 25g every 4 hours; CHILD under 1 year, 1 g/kg (approx. 5 ml/kg) every 4-6 hours; CHILD 1-12 years, 25-50 g every 4–6 hours

Refer Appendix 4, under treatment of poisoning

Administration aqueous slurry of charcoal should be made by suspending in a glass of water and should be administered; following administration of charcoal (after about 2 hours) a cathartic should be administered to enhance removal of poison charcoal complex promptly and to prevent enhanced toxicity; catharsis should occur within 4 to 8 hours after the use of activated charcoal

1.2 Specific

ATROPINE SULPHATE

Injection, 0.6mg/ml (1ml)

Therapeutic group specific antidote; antispasmodic medicines (antimuscarinic)

Indications poisoning with insecticides or mushroom; pre-anesthetic drying of respiratory tract; reversal of competitive neuromuscular blockade (with neostigmine); relaxation of acute smooth muscle spasm

Contraindications severe tachycardia, cardiovascular disease (IHD)

Cautions lactation (small amount in milk)

Side effects tachycardia, flushing and pupillary dilatation

Dose poisoning: by IM injection, 2mg repeated every 20 minutes until atropine side effects are seen; pre-medication: by IM injection, ADULT, 0.3-0.6mg 1 hour before induction; CHILD, 0.02mg/Kg, 1 hour before induction; reversal of blockade: by IV injection, 1mg with neostigmine 2. 5mg; spasmolytic: by IM injection, 1mg with appropriate analgesia

NOTE organophosphorous insecticides may be absorbed through the skin; the patient should wash contaminated skin with plenty of water to prevent further absorption
ANTI-SNAKE VENOM SERUM
Injection, powder for reconstitution (10ml) NRH/RRH/DH/BHU

Therapeutic group specific antidote

Indications treatment of bite from viper, cobra and krait

Contraindications known hypersensitivity to anti-serum, unless the danger to life outweighs the risk; bite by non-poisonous snake, or when puncture marks are not seen

Cautions history of previous serum injections (including antitetanus, antidiphtheria); history of allergy, asthma or eczema; test dose of 0.1ml serum in 0.9ml 0.9% sodium chloride to be injected SC and patient observed for 30 minutes; antihistamine and corticosteroid cover may be required, and adrenaline injection must always be at hand

Side effects local flare or general anaphylactic reaction may be seen after the test dose or during the full dose. Pallor, sweating, nausea, vomiting, urticaria and hypotension are the features of anaphylaxis. Injection of Adrenaline 1ml IM should be given immediately and 0.5ml after 10 minutes if required

Dose by IV injection, 10ml immediately; a further 10-20ml may be given after 2 hours or less, and then repeated 6-hourly as required; all injections should be given very slowly, not more than 1ml per minute, and preferably diluted in 100ml sodium chloride 0.9 % and given as a slow IV infusion

NALOXONE
Injection, 0.4mg/ml (1ml) NRH/RRH/DH

Therapeutic group specific antidote

Indications opioid poisoning; reversal of opioid-induced respiratory depression; post-operatively or in the neonate

Cautions patients with pre-existing physical dependence on opioids; cardiac irritability, cardiovascular disease

Side effects nausea, vomiting, tachycardia, fibrillation

Dose poisoning: by IV injection, ADULT, 0.8-2mg every 2 minutes to a maximum of 10mg; reversal of respiratory depression: by IV injection, ADULT, 0.1-0.2mg then 0.1mg every 2 minutes; a further 0.1-0.2mg IM may be given 1-2 hours later, if required; CHILD, 0.01mg/kg; increase to 0.1mg/kg, if no response (if no IV access, give SC in divided doses); NEONATE: 0.01mg/kg SC, IM or IV repeated every 2-3 minutes, or 0.06mg/kg by IM injection once only at birth

Note this medicine is short acting, and repeated injections may be required

PRLIDOXIME
Injection, 1g NRH/RRH/DH

Therapeutic group antidotes and other substances used in poisoning

Indications adjunct to atropine in the treatment of organophosphorus poisoning or nerve agent

Contraindications poisoning due to carbamates and to organophosphorus compounds without anticholinesterase activity

Cautions renal impairment, myasthenia gravis, pregnancy and lactation
Side effects: drowsiness, dizziness, disturbances of vision, nausea, tachycardia, headache, hyperventilation, and muscular weakness.

Dose: along with resuscitation measures and 2-4 mg atropine injection, administer 1-2 grams of the medicine IV as 5% solution in water over not less than 5-10 minutes or as infusion in 100ml sodium chloride 0.9% over 15-30 minutes; repeat therapy if needed; maximum dose, 12g in 24 hrs; CHILD, 20-60 mg/kg as required depending on severity of poisoning and response.

2. Anaesthetics

2.1. General anaesthetics

**HALOTHANE**

Inhalational (250ml) NRH/RRH

Therapeutic group: general anaesthetic

Indications: induction and maintenance of surgical anaesthesia

Contraindications: unexplained jaundice following previous halothane anaesthetic; susceptibility to malignant hyperpyrexia

Cautions: enquire about previous exposure/reactions to halothane, heart disease, previous history of post halothane jaundice, head injury, medicines which causes relaxation of the uterus; postpartum haemorrhage may occur

Interactions: see appendix 1 under general anaesthetics; avoid concomitant administration with adrenaline due to risk of cardiac failure

Side effects: hepatotoxicity (there is an increased risk with frequent exposure to halothane)

Dose: induction: 1-2 % halothane with or without nitrous oxide and oxygen; gradually introduce halothane up to 2-4% (CHILD: 1.5-2%); maintenance: 0.5-2% in gas-flow 8 litres/minute usually adequate

**ISOFLURANE**

Solution (250ml) NRH/RRH

Therapeutic group: general anaesthetic

Indications: induction and maintenance of surgical anaesthesia

Contraindications: susceptibility to malignant hyperthermia

Cautions: pregnancy; interactions

Interactions: see appendix 1 under general anaesthetics

Side effects: hepatotoxicity in those sensitized with halogenated anaesthetics but the risk is appreciable smaller than with halothane

Dose: induction: increase gradually from 0.5% to 3%, in oxygen or nitrous oxide-oxygen; maintenance: 1-2.5% in nitrous oxide-oxygen; an additional 0.5% -1% may be required when given with oxygen alone; caesarean section: 0.5-0.75% in nitrous oxide-oxygen

**NITROUS OXIDE**

Inhalation gas NRH/RRH

Therapeutic group: general anaesthetic and labour analgesia

Indications: induction and maintenance of surgical anaesthesia in combination with other anaesthetic agents and muscle relaxants and also analgesia for labour.
Contraindications: closed collections of air or gas in any body space, including intestinal obstruction, middle ear occlusion, eye surgery and in pneumothorax.

Cautions: continued post-operative oxygenation may be necessary for elderly patients; fire and explosion may be a risk.

Side effects: nausea and vomiting; after prolonged administration megaloblastic anaemia and depressed white cell formation; peripheral neuropathy.

Dose anaesthesia: ADULT and CHILD, nitrous oxide mixed with 25-30% Oxygen; analgesia: 50% nitrous oxide mixed with 50% oxygen.

**OXYGEN**

Inhalation gas: RH/RH/DH/BHU

Therapeutic group: general anaesthetics and oxygen.

Indications: to maintain oxygen tension in inhalation anaesthesia, ventilatory or cardiac failure, pneumonia, septicemia, pulmonary embolism, severe asthma and respiratory distress syndrome.

Cautions: fire and explosion may be a risk; high oxygen concentrations in incubators have led to the development of retrolental fibroplasia leading to permanent blindness in premature infants.

Side effects: oxygen concentrations above 80% have toxic effect on the lungs leading to pulmonary congestion, exudation and atelectasis.

**PROPOFOL**

Injection, 10mg/ml (10ml): NRH/RRH/DH

Therapeutic group: general anaesthetics (short-acting anaesthetic).

Indications: induction and maintenance of general anaesthesia; sedation in adult patients undergoing diagnostic procedures, in those undergoing surgery in conjunction with local or regional anaesthesia, and in ventilated adult patients under intensive care.

Contraindications: porphyria and hypersensitivity; children 16 years or less.

Side effects: apnoea, hyperventilation, coughing, pulmonary oedema; hypotension and bradycardia; nausea, vomiting, and headache may occur during recovery.

Cautions: propofol hypersensitivity, hypervolemia, epilepsy, increased intracranial pressure, lipid metabolism disorders, and in the elderly; hepatic and renal impairment; pregnancy.

Interactions: see appendix 1 under general anaesthetics.

Side effects: myocardial depression, laryngeal spasm, cough, sneezing, hypersensitivity reactions, rash, injection site reactions; inadvertent administration intra-arterially can lead to gangrene distally.

Dose induction: by IV infusion, ADULT below 55 years and CHILD over 12 years, 1.5-2.5mg/kg at a rate of 20-40mg every 10 seconds; high risk patients including ADULT over 55 years, neurosurgical, and debilitated patients, 20mg every 10 seconds until response; CHILD 1 month to 12 years, by IV infusion, 2.5-4mg/kg (most children over 8 years require an induction dose of 2.5 mg/kg; younger children may require a higher dose within the range of 2.5 to 4 mg/kg); maintenance: by IV infusion, ADULT and CHILD over 12 years, 4 to 12 mg/kg per hour (or 3 to 6 mg/kg per hour for elderly and debilitated patients) OR intermittent bolus injections of 20-50mg; CHILD 1 month to 12 years, by IV infusion, 9-15mg/kg/hour; induction of sedation in diagnostic and surgical procedures.
procedures: ADULT and CHILD over 12 years, initially by IV injection, over 3-5 minutes, 0.5-1mg/kg; dose and rate of administration to be adjusted according to response; CHILD 1 month-12 years, 1-2mg/kg; maintenance of sedation in diagnostic and surgical procedures: by IV infusion, ADULT and CHILD over 12 years, 1.5-4.5mg/kg/hour; dose and rate of administration to be adjusted according to level of sedation; high risk patients including ADULT over 55 years, neurosurgical, and debilitated patients may require lower dose (high risk patients usually require a 20% reduction in the maintenance dose); CHILD 1 month to 12 years by IV infusion, 1.5-9mg/kg/kg; sedation of ventilated patients in intensive care: by IV infusion, ADULT and CHILD over 16 years, 0.3 to 4 mg/kg/hour; if the duration of sedation is in excess of 3 days, lipid concentrations should be monitored

Note: Propofol is not recommended for use in obstetrics including caesarean section; repeated dose can lead to prolonged recovery and should not be used for maintenance; it has no analgesic activity and supplementary analgesia may be required

THIOPENTAL SODIUM

Injection, 1g NRH/RRH

Therapeutic group general anaesthetics

Indications induction of general anaesthesia; intractable seizures

Contraindications porphyria and hypersensitivity

Cautions hypotension, reduce induction dose in heart disease, elderly and shock

Overdosage respiratory depression progresses through hypotension to circulatory collapse; repeated dose can lead to prolonged recovery, therefore it should not be used for maintenance

Side effects myocardial depression, laryngeal spasm, cough, sneezing, hypersensitivity reactions, rash, injection site reactions; inadvertent administration intra arterially can lead to gangrene distally

Dose induction: by IV injection, usually as 2.5% solution over 10-15 seconds, ADULT 4-5mg/kg (reduce in elderly or debilitated patients); CHILD induction 2–7 mg/kg

Note: after dilution, do not store unused injection for more than 24 hours

KETAMINE

Injection, 50mg/ml (10ml) NRH/RRH/DH

Therapeutic group general anaesthetic

Indications induction and maintenance of general anaesthesia; used mainly for paediatric anaesthesia

Contraindications hypertension, congestive cardiac failure, stroke, alcoholism, eye injury and glaucoma; psychotic and convulsive disorders

Cautions ADULTs have a high incidence of hallucinations; excessive salivation may occur; always use atropine premedication

Interactions see appendix 1 under general anaesthetics

Side effects hallucinations, irrational behaviour, transient elevation of pulse rate and blood pressure; dysrhythmias and hypotension occasionally reported

Dose by IM injection, 10 mg/kg body weight; by IV injection, 1-2mg/ kg body weight
Note: diazepam administered before, during or after anaesthetic reduces incidence of hallucinations

**MIDAZOLAM**

Injection 1mg/ml (10ml) NRH/RRH/DH

**Therapeutic group** general anaesthetic (benzodiazepine)

**Indications** sedation with amnesia; sedation in intensive care; premedication, induction of anaesthesia

**Contraindications** marked neuromuscular respiratory weakness including myasthenia gravis; severe respiratory depression; acute pulmonary insufficiency

**Cautions** cardiac and respiratory disease, myasthenia gravis; history of medicine or alcohol abuse; reduce dose in elderly; avoid prolonged use (and abrupt withdrawal thereafter)

**Side effects** GI disturbances, increased appetite, jaundice, hypotension, cardiac arrest, heart rate changes, anaphylaxis, thrombosis, laryngospasm and bronchospasm; respiratory depression (and respiratory arrest with high doses or on rapid infusion); drowsiness, confusion, ataxia, amnesia, euphoria, hallucination, dizziness, vertigo, paradoxical excitement and aggression; urinary retention, incontinence, changes in libido, muscle weakness, visual disturbances; skin reactions; on IV injection, pain and thrombophlebitis

**Dose**

**Conscious sedation:** by slow IV injection, (approx. 2mg/min), initially 2-2.5mg (ELDERLY 0.5-1mg), increase if necessary in steps of 1mg (ELDERLY 0.5-1mg); by IV injection, over 2-3 minutes, CHILD 6 months-5 years, initially, 50-100mcg/kg, dose increased if necessary in steps (max. 6mg), CHILD 6-12 years, initially 25-50mcg/kg, dose increased in steps (max. 10 mg); **By IM injection**, CHILD 1-15 years, 50-150mcg/kg (max. 10 mg); **sedative in combined anaesthesia:** by IV injection, 30-100 mcg/kg repeated as required; CHILD not recommended; **Premedication:** by deep IM injection, 70-100 mcg/kg, 20 to 60 minutes before induction; CHILD 1-15 years 80-200 mcg/kg; **induction:** by slow IV injection, 150-200 mcg/kg; doses increased in steps not greater than 5 mg every 2 minutes (max. 600 mcg/kg); CHILD over 7 years, 150 mcg/kg; **sedation in intensive care:** by slow IV injection, initially 30-300 mcg/kg given in steps of 1-2.5 mg every 2 minutes, then by slow IV injection or IV infusion, 30-200 mcg/kg/hour; reduce dose (or omit initial dose) in hypervolemia, vasoconstriction, or hypothermia; lower doses may be adequate if opioid analgesic also used; NEONATE under 32 weeks gestational age, by IV infusion, 30 mcg/kg/hour, NEONATE over 32 weeks gestational age and CHILD under 6 months, 60mcg/kg/hour; CHILD over 6 months, by slow IV injection, initially 50-200 mcg/kg, then by IV infusion , 60-120 mcg/kg/hour

### 2.2. Local anaesthetics

**BUPIVACAINE**

Injection, 0.5% (plain) (20ml) NRH/RRH
Injection, 0.5% (heavy) (4ml) NRH/RRH

**Therapeutic group** local anaesthetics

**Indications** infiltration anaesthesia; peripheral nerve block; spinal and epidural anaesthesia

**Contraindications** hypovolaemia, complete heart block

**Cautions** epilepsy, hepatic or renal impairment, impaired cardiac condition, bradycardia, porphyria
Side effects: confusion, respiratory depression, convulsions, hypotension, ventricular fibrillation especially in pregnancy, known hypersensitivity and anaphylactic shock

Dose local infiltration: 0.25%; peripheral nerve block: 0.25%-0.5%; epidural block: 0.1-0.5%; caudal: 0.25-0.5%; (max. 2mg/kg without adrenaline in 24 hrs; 3mg/kg body weight with adrenaline in 24 hrs)

**LIGNOCAINE**

Injection, 2%-with preservative (30ml)  
Injection, 2%-preservative free (50ml)  
Injection, 5% (heavy) (2ml)  

Therapeutic group: local anaesthetic

Indications: (a): infiltration anaesthesia, peripheral nerve block, and regional anaesthesia; (b): 5% heavy injection is used for spinal anaesthesia

Contraindications see under bupivacaine (section 2.2)

Cautions see under bupivacaine (section 2.2)

Side effects see under bupivacaine (section 2.2)

Dose infiltration: 1-2%; perineal infiltration: 0.5%; nerve block: 1-2%; epidural: 2%; spinal: 5%; caudal: 2%; (max. 3mg/kg without adrenaline; 7mg/kg with adrenaline)

**LIGNOCAINE**

Injection, 2% + adrenaline 1 in100, 000 (30ml)  
Injection, 2% + adrenaline 1 in 200,000 (30ml)  
Injection, 2% + adrenaline 1:80000 (1.8ml)  

Therapeutic group: local anaesthetic

Indications: dental anaesthesia; infiltration anaesthesia, nerve block

Contraindications: avoid if there is known or suspected hypersensitivity; avoid spinal or epidural anaesthesia in patient on anticoagulant therapy and abnormal bleeding tendency; contraindicated in arterial hypertension, coronary disease and valvular cardiac disease (particularly squeal to acute rheumatic fever); see bupivacaine also

Cautions: lignocaine with adrenaline when used together with halothane; see under bupivacaine

Side effects see under bupivacaine

Dose see above under lignocaine; Dental: ADULT, a single cartridge is generally sufficient; 2 are used in case of large interventions; do not exceed 3 cartridges; ADOLESCENTS 14-17 years and ELDERLY, usual dose 1.8ml (1 cartridge); do not exceed 3.6ml (2 cartridges) in usual cases; CHILD 6-14-years, usual dose 1.35ml (3/4 of a cartridge); do not exceed 2.7ml (1 ½ cartridge) in usual cases; CHILD 3-6 years, 0.9 to 1.8ml (1/2 to 1 cartridge); do not use under 3 years of age

Note: the addition of vasoconstrictor such as adrenaline diminishes local blood flow, slows the rate of absorption of local anaesthetic and prolongs its local effect

**LIGNOCAINE**

Solution, 4% (30ml)  

National Essential Medicines Formulary 2016
Spray, 10% (80ml)  
**Therapeutic group** local anaesthetic  
**Indications** surface anaesthesia of mucosa: pharynx, larynx, trachea and urethra  
**Contraindications** known or suspected hypersensitivity  
**Cautions** absorption from inflamed or highly vascular surfaces may cause systemic effects  
**Side effects** see under bupivacaine  
**Dose lignocaine 10%**: dental practice: 1-5 doses; procedure in pharynx, larynx and trachea: up to 20 doses; lignocaine 4%: bronchoscopy: 1-7.5ml with suitable spray; biopsy in mouth: 3-4ml with suitable spray or swab

**ETHYL CHLORIDE**

Spray (100ml)  
**Therapeutic group** local anaesthetic  
**Indications** local anaesthesia  
**Contraindications** avoid in the presence of diethyl amine because it is highly inflammable  
**Dose**: open drop: 3-20ml may be required; vaporiser: 3-4.5% in inhaled gases

3. Analgesics, antipyretics, NSAIMS and medicines used to treat gout  
3.1 Non-opioids

**PARACETAMOL**

Injection, 150mg/ml (2ml)  
Suppository, 250mg  
Syrup, 125mg/5mL (60ml)  
Tablet, 500mg  
**Therapeutic group** analgesic; antipyretic  
**Indications** symptomatic relief of mild to moderate pain and fever; febrile convulsions  
**Contraindications** hepatic failure  
**Cautions** hepatic and renal impairment; alcohol dependence  
**Over dosage** acute liver failure, (acute overdose: 150mg/kg of body weight or 10-15gms within 24 hours may result in severe liver damage, hypoglycaemia and acute renal tubular necrosis)  
**Dose by oral administration**, ADULT, 500-1000mg repeated as required every 4-6 hours for 3-5 days (max. 4000mg daily); CHILD up to 2 months, 60mg for post immunisation pyrexia otherwise under 3 months 10mg/kg (5mg/kg, if jaundiced); CHILD 1-5 years, 120-250mg; CHILD 6-12 years: 250-500mg; these doses may be repeated every 4-6 hours when necessary (max. 4 doses in 24 hours); by IV infusion, over 15 minutes, ADULT over 50 kg, 1000 mg every 4–6 hours (max. 4000mg daily); ADULT 33–50 kg, 15 mg/kg every 4-6 hours (max. 60 mg/kg daily); by rectum, ADULT, 0.5-1g; CHILD 1-5 years, 125-250mg; CHILD 6-12 years, 250-500mg every 4-6 hours

**IBUPROFEN**

Tablet, 400mg  
**Therapeutic group** nonsteroidal anti-inflammatory medicines (NSAIMS)
Indications pain and inflammation in rheumatic disease (including juvenile arthritis) and other musculoskeletal disorders; mild to moderate pain; fever and pain in children

Contraindications active peptic ulcer disease, severe congestive cardiac failure

Cautions allergic disorders, pregnancy (after 32 weeks); coagulation defects in patients with renal, cardiac or hepatic impairment; use with caution in elderly since use of NSAIMS may result in deterioration of renal function after prolonged use

Interactions see appendix 1 under NSAIMS

Side effects GI discomfort, nausea, diarrhoea, occasional bleeding and peptic ulceration may occur; hypersensitivity, headache and vertigo may also occur

Dose by oral administration, ADULT, 400mg 3-4 times daily; may be increased to 800mg 3 times daily if required; juvenile arthritis (CHILD over 7kg): 30-40mg/kg in 3-4 divided doses; not recommended for children under 7Kg

Counseling take after food

Note: evidence on the relative safety of NSAIMS indicates difference in the risks of serious upper GI side effects; ibuprofen is safer than indomethacin, diclofenac and aspirin

INDOMETHACIN

Capsule, 25mg NRH/RRH

Therapeutic group non-steroidal anti-inflammatory medicine (NSAIM)

Indications pain and moderate to severe inflammation in rheumatic disease and other acute musculoskeletal disorders; acute gout and dysmenorrhoea

Contraindications see under ibuprofen

Cautions see under ibuprofen; dizziness may affect performance of skilled tasks like driving

Interactions see appendix 1 under NSAIMS

Side effects see under ibuprofen

Dose rheumatic diseases: by oral administration, 50-200mg daily in divided dose till the alleviation of symptoms; acute gout: 150-200mg daily in divided doses till alleviation of symptoms; dysmenorrhoea: up to 75mg, three times daily for 3-5 days; not recommended for children

Counseling take after food; if you become dizzy, you must not drive or operate any machinery

DICLOFENAC SODIUM

Injection, 25mg/ml (3ml) NRH/RRH/DH/BHU

Therapeutic group non-opioid analgesics

Indications pain and inflammation in rheumatic disease (including juvenile arthritis) and other musculoskeletal disorders, ankylosing spondylitis

Contraindications and cautions see ibuprofen

Interactions see appendix 1 under NSAIMS

Side effects see ibuprofen

Dose acute exacerbations of pain and postoperative pain: by IM injection, 75 mg once daily (twice daily in severe cases) for a max. of 2 days; ureteric colic: by IM injection, 75mg then a further 75mg after 30 minutes if necessary;
by IV infusion, 75 mg repeated if necessary after 4-6 hours for max 2 days;
prevention of postoperative pain: by IV infusion initially after surgery, 25-
50 mg over 15-60 minutes then 5 mg/hour for max. 2 days

MEFENAMIC ACID
Tablet, 500mg NRH/RRH
Therapeutic group non-steroidal anti-inflammatory medicines
Indications dysmenorrhea and menorrhagia
Contraindications and caution see ibuprofen
Interactions see appendix 1 under NSAIMs
Side effects see ibuprofen
Dose: by oral administration, 500mg three times daily, preferably after food
Counseling take after food

ASPIRIN
Tablet, 325mg NRH/RRH/DH
Therapeutic group non-steroidal Anti-inflammatory Medicines (NSAIMs)
Indications secondary prevention of thrombotic cerebrovascular or cardiovascular disease; osteoarthritis and rheumatoid arthritis
Contraindications hypersensitivity to aspirin or other NSAIMs; use other than as an antiplatelet in children and adolescents under 16 years (Reye’s syndrome); active peptic ulceration; haemophilia and other bleeding disorders
Cautions asthma, uncontrolled hypertension, pregnancy and breastfeeding
Interactions acetazolamide, ACE inhibitors, warfarin, heparin, beta blockers, diuretics, probenecid, methotrexate, NSAIMs, phenytoin, valproates; see appendix 1
Side effects bronchospasm; gastrointestinal haemorrhage; vomiting, upset stomach; heartburn; drowsiness; or headache.
Dose by oral administration, 325mg three to four times daily; maximum 4g daily; not recommended in children below 16 years
Counseling to be taken after or with meals

3.2 Opioid analgesics

CODEINE PHOSPHATE
Tablet, 15mg NRH/RRH/DH
Therapeutic group opioid analgesic
Indications mild to moderate pain, control of chronic diarrhoea (e.g. due to cytotoxic), dry irritating cough
Contraindications avoid in raised intracranial pressure or head injury, liver disease and ventilatory failure
Cautions hypotension, hypothyroidism, asthma (avoid during attack), pregnancy and breastfeeding; reduce dose or avoid in renal impairment, dependence; use of cough suppressants containing opioid analgesics not recommended in children and should be avoided altogether in those under 1 year; hepatic and renal impairment; history of medicine abuse
Interactions see appendix 1 under opioid analgesics
Side effects: nausea and vomiting, constipation, and drowsiness; larger doses produce hypotension and respiratory depression; for over dosage, naloxone is a specific antagonist.

Dose: by oral administration, ADULT, 30-60mg every 4 hours up to a max of 240mg in a day; CHILD 1-12 years, 3mg/Kg daily in divided doses; not recommended for diarrhoea in children.

Counseling: this medicine may cause drowsiness, and you should not drive or operate machinery while taking it.

Note: tolerance and dependence may occur with prolonged use; in terminal care, this should not inhibit treatment, but simultaneous administration of laxative medicines may be required; chronic diarrhoea should be investigated before any attempt to suppress it with codeine phosphate.

MORPHINE

Injection, 15mg/ml (1ml) NRH/RRH/DH
Tablet, 10mg NRH/RRH/DH

Therapeutic group: opioid analgesic

Indications: moderate to severe pain especially in pain associated with cancer, myocardial infarction, and surgery.

Contraindications: see codeine phosphate.

Cautions: see codeine phosphate.

Interactions: see appendix 1.

Side effects: see codeine phosphate.

Dose: acute pain: by IM injection, 10mg (ELDERLY or frail, 5 mg) every 4 hours; NEONATE, initially 100 mcg/kg every 6 hours; CHILD 1-6 months, 100-200 mcg/kg every 6 hours; CHILD 6 months-2 years, 100-200 mcg/kg every 4 hours; CHILD 2-12 years, 200mcg/kg every 4 hours; CHILD 12-18 years, 2.5-10 mg every 4 hours; by slow IV, initially 5 mg (reduce dose in ELDERLY or frail) every 4 hours; NEONATE initially 50 mcg/kg every 6 hours; CHILD 1-6 months initially 100 mcg/kg every 6 hours; CHILD 6 months-12 years, 100 mcg/kg every 4 hours; premedication: by IM injection, up to 10 mg 60-90 minutes before operation; CHILD 150 micrograms/kg; myocardial infarction: by slow IV (1-2 mg/minute), 5-10 mg followed by a further 5-10 mg if necessary; ELDERLY or frail patients reduce dose by half; chronic pain: by oral administration or IM injection, 5-10 mg every 4 hours, adjusted according to response.

PETHIDINE

Injection, 50mg/ml (1ml) NRH/RRH/DH

Therapeutic group: opioid analgesic.

Indications: moderate to severe pain, including labour pain and post-operative analgesia.

Contraindications: see codeine phosphate.

Cautions: see codeine phosphate.

Interactions: see appendix 1 under opioid analgesics.

Side effects: see codeine phosphate.

Dose: acute pain: by IM injection, 25-100 mg (ELDERLY or debilitated, initially 25 mg), repeated after 4 hours; by slow IV, 25-50 mg (ELDERLY or debilitated, initially 25 mg), repeated after 4 hours; obstetric analgesia: by IM injection, 50-
100 mg, repeated 1-3 hours later if necessary; max. 400 mg in 24 hours; **postoperative pain**: IM, 25-100 mg (ELDERLY or debilitated, initially 25 mg), every 2-3 hours if necessary; CHILD, under 18 years not recommended

*Note in the postoperative period, the patient should be closely monitored for pain relief as well as for side effects, especially respiratory depression*

### TRAMADOL HYDROCHLORIDE

**Injection**, 50mg/ml  
**NRH/RRH/DH**  
**Therapeutic group** opioid analgesic  
**Indications** moderate to severe pain  
**Contraindications** see codeine phosphate  
**Cautions** see codeine phosphate  
**Interactions** see appendix 1 under opioid analgesics  
**Side effects** see codeine phosphate; hypotension; occasionally hypertension; anaphylaxis; hallucinations, and confusion  
**Dose by IM or IV injection or by IV infusion** (over 2-3 min), 50-100mg every 4-6 hours; **post-operative pain**: 100mg initially, then 50mg every 10-20 min if necessary during the first hour up to max of 250mg; then 50-100 mg every 4-6 hours; *Not recommended in children*

### FENTANYL CITRATE

**Injection**, 50 mcg/ml (2ml)  
**Patch**, 50mcg/hr (72 hours)  
**NRH/RRH**  
**Therapeutic group** opioid analgesics  
**Indications** analgesia during surgery, enhancement of anaesthesia; respiratory depressant in assisted respiration; epidural analgesia in combination with bupivacaine  
**Contraindications** see under codeine phosphate  
**Cautions** see under codeine phosphate  
**Interactions** see appendix 1 under opioid analgesics  
**Side effects** see under codeine phosphate; also myoclonic movements, less commonly laryngospasm; rarely asystole, insomnia  
**Dose by IV injection, with spontaneous respiration**, 50-200mcg as required; CHILD 1-5 mcg/kg, then 1mcg/kg as required; with assisted ventilation, 0.3-3.5 mg, then 100-200 mcg as required; CHILD 5-10mcg/kg, then 1-3 mcg/ kg as required; by transdermal delivery (patch), 25-100mcg/hr, applied every 72 hrs  
**Note** avoid excessive dosage in obese patient; dose may need to be calculated on the basis of ideal body weight

#### 3.3 Antigout medicines

### ALLOPURINOL

**Tablet**, 100mg  
**NRH/RRH/DH**  
**Therapeutic group** medicine used to treat gout (xanthine oxidase inhibitor)  
**Indications** gout  
**Contraindications** not a treatment for acute gout but continue if attack develops when already receiving allopurinol, and treat attack separately
Cautions prophylactic administration of a NSAIDs (not aspirin) is recommended until a month after the uric acid level becomes normal; adequate fluid intake must be ensured (2-3 litres/day); caution is needed in hepatic and renal impairment; in pregnancy, use only if no safer alternative and the disease carries risk for mother and child

Interactions see appendix 1

Side effects rashes, sometimes with fever, may be seen. (If mild, withdraw therapy and then re-introduce cautiously at a very low dose & increase gradually; discontinue immediately if recurrence occurs)

Dose by oral administration, ADULT, initially 100 mg daily, preferably after food, then adjusted according to plasma uric acid concentration; usual maintenance dose in mild conditions: 100-200 mg daily; in moderately severe conditions: 300-600 mg daily; in severe conditions: 700-900 mg daily; doses over 300 mg daily given in divided doses; CHILD under 15 years (in neoplastic conditions, enzyme disorders): 10-20 mg/kg daily (max. 400 mg daily)

Counseling Take after food with plenty of fluids

4. Disease Modifying Anti-Rheumatic Medicines (DMARMs)

METHOTREXATE

Tablet, 2.5mg NRH/RRH/DH

Therapeutic group antineoplastic medicines

Indications maintenance therapy for rheumatoid arthritis and other mixed connective tissue disorder

Contraindications significant renal impairment and haematological failure; to be avoided if significant pleural effusion or ascites is present; Liver impairment; pregnancy and lactation

Cautions blood counts should be monitored

Interactions see appendix 1

Side effects ulcerative stomatitis, leucopenia, hepatotoxicity, nausea, abdominal distress, malaise, fatigue, chills, fever, dizziness, decreased resistance to infection, rash, bone marrow depression, gingivitis, renal failure, headache, blurred vision; uncommon with low dose maintenance therapy

Dose active rheumatoid arthritis (RA): by oral administration, 7.5mg once weekly (as a single dose or divided into 3 doses of 2.5mg given at intervals of 8 hr) adjusted according to response; max total weekly dose: 20mg; psoriasis: 10-25mg once weekly, adjusted according to response; child not recommended; reduce dose in elderly

Note: pulmonary toxicity may be a special problem in RA. Patient to seek advice if dyspnoea, cough or fever develops

CHLOROQUINE

Tablet, 150mg NRH/RRH/DH/BHU

Therapeutic group antimalarial; DMARMs

Dose by oral administration, ADULT, 150mg (base) daily; max. 2.5mg/kg daily; CHILD, up to 3mg/kg daily

For details see chloroquine under antimalarial
HYDROXYCHLOROQUINE

Tablet, 200mg

NRH/RRH

Therapeutic group disease modifying antirheumatoid medicines (DMARMS)

Indications treatment of systemic and discoid lupus erythematosus and rheumatoid arthritis; also used in the treatment of light-sensitive skin eruptions

Cautions hepatic and renal impairment; concurrent use of hepatotoxic medicines should be avoided; epilepsy and myasthenia gravis; G-6-PD deficiency

Side effects headache, skin eruptions, pruritus, nausea, vomiting, and diarrhea; visual disturbances such as blurred vision (common with higher doses and long term use)

Dose by oral administration, initially, 400mg daily in divided doses; maintenance 200-400mg daily

Counseling report if there are any visual disturbances and get the vision checked

5. Anti-allergies and medicines used in anaphylaxis

CETIRIZINE

Tablet, 10mg

NRH/RRH/DH/BHU

Therapeutic group antiallergies

Indications symptomatic relief of allergy such as hay fever, urticaria

Contraindications pregnancy and breastfeeding

Side effects incidence of sedation is low; drowsiness is a significant side effect with most of the older anti-histamines although paradoxical stimulation may occur rarely, especially with high doses or in children and the elderly; drowsiness may diminish after a few days of treatment and is considerably less of a problem with the newer antihistamines

Dose by oral administration, ADULT & CHILD over 6 years, 10g daily or 5mg twice a day; CHILD 2-6 years, 5mg daily or 2.5mg twice a day

Counseling may cause drowsiness, do not drive or operate machinery; avoid alcohol

PROMETHAZINE

Injection, 25mg/ml (2ml)

NRH/RRH/DH/BHU

Tablet,10mg

NRH/RRH/DH/BHU

Therapeutic group antiallergies (sedating antihistamines)

Indications allergic phenomena; nausea and vomiting; pre-medication and emergency treatment of anaphylactic reactions

Side effects sedation, dizziness and other CNS symptoms are common at the start of treatment, but tolerance usually develops; GI irritation and anticholinergic effects are occasionally seen

Dose by oral administration, ADULT, 10-20mg 2-3 times daily for 3 days; 20mg at night may be preferable in seasonal rhinitis; CHILD, 1mg/kg per day, in divided doses by mouth; by IM injection, ADULT, 25-50mg; CHILD, 2-5 Years, 5-15mg; 5-10 years, 5-25mg; By slow IV injection in emergencies, 25-50 mg as a solution containing 2.5 mg/ml in water for injection; max. 100 mg; child under 2 years not recommended
Counseling may cause drowsiness, do not drive or operate machinery; avoid alcohol

**ADRENALINE**

Injection, 1mg/ml (1ml) NRH/RRH/DH/BHU

Therapeutic group vasoconstrictor sympathomimetic

Indications anaphylactic shock, asthma and cardiac arrest, severe angioedema

Cautions hyperthyroidism, diabetes mellitus, heart disease, hypertension, arrhythmias, cerebrovascular disease, angle-closure glaucoma, second stage of labour, elderly patients

Interactions see appendix 1 under sympathomimetic

Side effects anxiety, tremor, tachycardia, arrhythmias, headache, cold extremities; also hypertension (risk of cerebral haemorrhage) and pulmonary oedema (on excessive dosage or extreme sensitivity); nausea, vomiting, sweating, weakness, dizziness and hyperglycaemia

Overdosage sudden extreme hypertension may lead to cerebral haemorrhage; reversal by vasodilatation with isosorbide dinitrate may be attempted

**Dose anaphylaxis:** By IM injection, as given below:

<table>
<thead>
<tr>
<th>Age</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1-year</td>
<td>0.05ml</td>
</tr>
<tr>
<td>2 years</td>
<td>0.2ml</td>
</tr>
<tr>
<td>3-4 years</td>
<td>0.3ml</td>
</tr>
<tr>
<td>5 years</td>
<td>0.4ml</td>
</tr>
<tr>
<td>6-12 years</td>
<td>0.5ml</td>
</tr>
<tr>
<td>ADULT</td>
<td>0.5-1.0ml</td>
</tr>
</tbody>
</table>

Doses may be repeated every 10 minutes, according to blood pressure and pulse, until improvement occurs (may be repeated several times); **asthma:** by IM injection, ADULT, 0.1-0.5mg at 15-20 minute intervals as required; CHILD, 0.01mg/kg SC, repeated after 4 hours if required; **cardiac arrest:** 1mg intracardiac injection in extremis; then IV as for anaphylaxis (for IV injection, dilute 1:10 in water for injection)

**DEXAMETHASONE**

Injection, 4mg/ml (2ml) NRH/RRH/DH/BHU

Tablet, 4mg NRH/RRH

Therapeutic group corticosteroids

Indications allergic conditions; inflammation, cerebral oedema; shock

Cautions prolonged use of steroids increases susceptibility to infections and severity of infections; see under prednisolone

Interactions see appendix 1 under corticosteroids

Side effects none in short term emergency use

Dose by oral administration, ADULT, 1-4mg two to three times daily; CHILD, 0.5-2mg/kg two to three times daily; By IM injection, ADULT, 4-8mg repeated up to a total of 20mg if required; CHILD, 1-3mg 6 hourly
PREDNISOLONE
Tablet, 5mg and 20mg

Therapeutic group antiallergic; adrenal hormones and synthetic substitutes

Indications suppression of inflammatory and allergic disorders, inflammatory bowel disease, asthma, immuno-suppression, rheumatic disease, nephrotic syndrome

Cautions none in short term emergency use; flare up of pre-existing infection with prolonged use, Cushingoid syndrome may be seen, also growth suppression in children; high doses in pregnancy or breastfeeding may lead to adrenal suppression in the foetus/infant; withdrawal of steroids after prolonged administration needs care to avoid Addisonian crisis; this will occur acutely, or during illness/operation/labour, even several months later

Interactions see appendix 1 under corticosteroids

Side effects GI effects include dyspepsia, peptic ulceration (with perforation), abdominal distension, acute pancreatitis, oesophageal ulceration and candidiasis; musculoskeletal effects include proximal myopathy, osteoporosis, vertebral and long bone fractures, avascular osteonecrosis, tendon rupture; endocrine effects include adrenal suppression, menstrual irregularities and amenorrhoea, Cushing’s syndrome (with high doses, usually reversible on withdrawal), hirsutism, weight gain, negative nitrogen and calcium balance, increased appetite; increased susceptibility to and severity of infection; neuropsychiatric effects include euphoria, psychological dependence, depression, insomnia, and increased intracranial pressure with papilloedema in children (usually after withdrawal), psychosis and aggravation of schizophrenia, aggravation of epilepsy; ophthalmic effects include glaucoma, papilloedema, posterior subcapsular cataracts, corneal or scleral thinning and exacerbation of ophthalmic viral or fungal disease; other side-effects include impaired healing, skin atrophy, bruising, striae, telangiectasia, acne, myocardial rupture following recent myocardial infarction, fluid and electrolyte disturbance, leucocytosis, hypersensitivity reactions (including anaphylaxis), thromboembolism, nausea, malaise and hiccups

Dose initial: by oral administration, 10-20 mg daily, may increase to 1mg/kg (severe disease up to 60 mg daily), preferably taken in the morning after breakfast; maintenance: 2.5-15 mg daily can be increased with need; CHILD, 1-2mg/kg (max 60mg); Cushing's side effects increasingly likely with doses above 7.5 mg daily

Counseling to be taken after or with meals

Note in acute asthma, tail off steroids within 7-10 days to avoid adrenal suppression

BUDESONIDE
Spray, 50mcg/puff (200MDIs)

Therapeutic group corticosteroids

Indications prophylaxis and treatment of rhinitis; management of nasal polyps

Side effects systemic absorption following nasal use may lead to adrenal suppression

Dose by nasal administration, ADULT and CHILD over 12 years, 1 spray into each nostril one to two times daily; treatment can be continued for up to 3 months
6. Medicines for Meniere’s disease

**BETAHISTINE DIHYDROCHLORIDE**

Tablet, 16mg  
NRH/RRH

**Therapeutic group** medicines for Meniere’s disease  
**Indications** vertigo, tinnitus, hearing loss associated with Meniere’s disease  
**Contraindications** pheochromocytoma  
**Cautions** asthma, history of peptic ulcer, pregnancy and breastfeeding  
**Side effects** GI disturbances, headache, rashes, pruritis  
**Dose** **by oral administration**, initially 16mg three times a day, preferably with food; maintenance: 32-48mg daily. **Child not recommended.**  
**Counseling** take with or after food

**CINNARIZINE**

Tablet, 15mg  
NRH/RRH

**Therapeutic group** medicines for Meniere’s disease  
**Indications** vestibular disorders, such as vertigo, tinnitus, nausea, and vomiting in Meniere’s disease; motion sickness; vascular disease  
**Contraindications** porphyria  
**Cautions** hypotension, pregnancy, children, elderly  
**Interactions** enhanced sedative effects  
**Side effects** drowsiness  
**Dose** **vestibular disorders**: **by oral administration**, ADULT, 30 mg 3 times daily; CHILD 5–12 years, 15mg 3 times daily; **motion sickness**: **by oral administration**, ADULT, 30mg 2 hours before travel, then 15mg every 8 hours during journey, if necessary; CHILD 5-12 years, 15mg 2 hours before travel and 7.5mg every 8 hours during the journey if necessary

7. Antimigraine medicines

7.1. Treatment of acute attack

**ERGOTAMINE + CAFFEINE**

Tablet, (1mg+100mg)  
NRH/RRH/DH

**Therapeutic group** antimigraine medicines  
**Indications** symptomatic relief of migraine  
**Contraindications** peripheral or coronary vascular disease, severe hypertension, severe hepatic or renal impairment; pregnancy  
**Cautions** risk of overuse by patients, leading to vascular insufficiency; breastfeeding  
**Interactions** see appendix 1 under ergotamine and ergometrine  
**Side effects and over dosage** malaise, nausea and vomiting may occur; chronic self-poisoning can lead to sustained vasoconstriction and eventual gangrene; the medicine should be immediately and totally withdrawn. Acute over dosage may occur with only 2-3 times the normal dose; symptoms include vomiting, diarrhoea, thirst, paraesthesia, cold extremities, rapid and weak pulse, confusion, convulsion and coma. Lavage followed by vasodilators or dextran 40 infusions should be done
**Dose by oral administration** 1-2 tablet at the onset of symptoms (max of 4 tabs in 24 hours), one more after ½ an hour if needed; not to be repeated at intervals of less than 4 days; Maximum dose: 8 tablets per week: not recommended in children

**Note** only use ergotamine if the headache is unresponsive to simple analgesics

### 7.2. Prophylaxis

**AMITRIPTYLINE**

<table>
<thead>
<tr>
<th>Tablet, 25mg</th>
<th>NRH/RRH/DH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapeutic group</td>
<td>tricyclic antidepressant</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td>depression with agitation or insomnia, anxiety, neuropathic pain and migraine prophylaxis</td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td>see amitriptyline under section 12.2</td>
</tr>
<tr>
<td><strong>Cautions</strong></td>
<td>see amitriptyline under section 12.2</td>
</tr>
<tr>
<td><strong>Interactions</strong></td>
<td>see appendix 1 under anti-depressants, tricyclic</td>
</tr>
<tr>
<td><strong>Side effects</strong></td>
<td>see amitriptyline under section 12.2</td>
</tr>
<tr>
<td><strong>Dose by oral administration</strong></td>
<td>12.5-25mg daily at bed time; up to 100mg daily</td>
</tr>
</tbody>
</table>

**PROPRANOLOL**

<table>
<thead>
<tr>
<th>Tablet, 40mg</th>
<th>NRH/RRH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapeutic group</td>
<td>antimigraine; antiarrhythmic; antiangina and antithyroid medicines</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td>prophylaxis of migraine, treatment of angina, arrhythmias, and hyperthyroidism</td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td>asthma, uncontrolled heart failure, cardiogenic shock, marked bradycardia, metabolic acidosis</td>
</tr>
<tr>
<td><strong>Cautions</strong></td>
<td>pregnancy and breastfeeding, diabetes, liver disease; avoid abrupt withdrawal in angina</td>
</tr>
<tr>
<td><strong>Interactions</strong>:</td>
<td>see appendix 1 under beta-blockers</td>
</tr>
<tr>
<td><strong>Side effects</strong></td>
<td>bradycardia, heart failure, bronchospasm, peripheral vasoconstriction, GI disturbance, fatigue and sleep disturbance may sometimes occur</td>
</tr>
<tr>
<td><strong>Dose by oral administration</strong></td>
<td>40mg 3-4 times daily; maintenance 80-160 mg daily</td>
</tr>
<tr>
<td><strong>Counseling</strong></td>
<td>take this medicine regularly; do not stop without doctor's instruction</td>
</tr>
</tbody>
</table>

### 8. Antiepileptics

**DIAZEPAM**

<table>
<thead>
<tr>
<th>Injection, 5mg/ml (2ml)</th>
<th>NRH/RRH/DH/BHU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablet, 5mg</td>
<td>NRH/RRH/DH/BHU</td>
</tr>
<tr>
<td>Therapeutic group</td>
<td>antiepileptics; anxiolytics</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td>short-term use in anxiety and insomnia; adjunct in alcohol withdrawal; status epilepticus, febrile convulsions</td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td>respiratory depression, severe hepatic impairment, chronic psychosis</td>
</tr>
</tbody>
</table>

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National Essential Medicines Formulary 2016
Cautions muscle weakness; pregnancy and breastfeeding; reduce dose in elderly and hepatic impairment; renal impairment; avoid prolonged use and abrupt withdrawal

Interactions see appendix 1 under anxiolytics

Side effects drowsiness and light-headedness, persisting until next day; confusion and ataxia in the elderly; tolerance, amnesia, muscle weakness; hypotension and apnoea

Dose by IV injection, ADULT, 10-20mg at a rate of 1ml/minute repeated if necessary after 30-60 minutes; may be followed by IV infusion to max. 3 mg/kg over 24 hours; CHILD, 200-300mcg/Kg

**CLONAZEPAM**

Tablet, 0.5mg NRH

Therapeutic group antiepileptic; antianxiety (benzodiazepines)

Indications all forms of epilepsy; myoclonus; status epilepticus

Contraindications respiratory depression, severe hepatic impairment, chronic psychosis; myasthenia gravis

Caution muscle weakness, pregnancy and breast-feeding; reduce dose in elderly and hepatic impairment, renal impairment; history of medicine and alcohol abuse; Avoid prolonged use and abrupt withdrawal

Interactions see Appendix 1 under benzodiazepines

Side effects drowsiness, fatigue and light-headedness, persisting until next day; confusion and ataxia in the elderly; salivary hypersecretion in infants; tolerance, amnesia, muscle weakness; hypotension and apnoea

Dose by oral administration, ADULT, 1mg (ELDERLY 500 mcg) initially at night for 4 nights, increase according to response over 2-4 weeks to usual maintenance dose of 4-8 mg usually at night in 3-4 divided doses; CHILD up to 1 year, initially 250mcg increased as above to usual maintenance dose of 0.5-1mg; CHILD 1-5 years, initially 250mcg increased as above to 1-3mg; CHILD 5-12 years, initially 500mcg increased as above to 3-6 mg

Counseling do not drive or operate machineries; avoid alcohol

**PHENOBARBITAL**

Injection, 200mg/ml (1ml) NRH/RRH/DH

Tablet, 30mg NRH/RRH/DH/BHU

Therapeutic group antiepileptic

Indications all forms of epilepsy except absence seizures; status epilepticus

Contraindications porphyria

Cautions elderly, debilitated, children, impaired renal (avoid large doses) and hepatic function (may precipitate coma), respiratory depression; pregnancy and breastfeeding; avoid sudden withdrawal

Interactions see appendix 1 under barbiturates

Side effects drowsiness, lethargy, depression, ataxia and allergic skin reactions; paradoxical excitement, restlessness and confusion in the elderly and hyperkinesia in children; megaloblastic anaemia

Dose by oral administration, ADULT, 60-180mg at night; CHILD, 5-8mg/kg daily; control of acute seizures: by IM injection, 200mg, repeated after 6 hours if necessary; CHILD, 15mg/ kg as a single dose; status epilepticus: by IV
injection (dilute injection 1 in 10 with water for injection), 10mg/kg at a rate of not more than 100mg/min; max 1g

Counseling may cause drowsiness; do not drive or operate machinery; do not stop taking this medicine without the doctor’s advice

SODIUM VALPROATE

Tablet, 200mg NRH/RRH

Therapeutic group antiepileptics

Indications all forms of epilepsy

Contraindications active liver disease, family history of severe hepatic dysfunction; pregnancy

Cautions monitor liver function before therapy and during first 6 months; benefit of treatment outweighs risk in pregnancy; folic acid supplement is however needed; monitor platelet function before surgery; may give false positive test for ketonuria in diabetes

Interactions see appendix 1 under valproate

Side effects gastric irritation and nausea, ataxia and tremor; transient hair loss; increased appetite; thrombocytopenia; impaired liver function (withdraw immediately if evidence of hepatitis)

Dose by oral administration, ADULT, initially, 600 mg daily given in 2 divided doses, increasing by 200 mg/day at 3-day intervals to a max of 2.5 g daily in divided doses; usual maintenance 1-2 g daily (20-30 mg/kg daily); CHILD up to 20 kg, initially 20 mg/kg daily in divided doses, may be increased provided plasma concentrations monitored; CHILD over 20 kg, initially 400 mg daily in divided doses increased until control (usually in range of 20-30 mg/kg daily); max. 35mg/kg daily

Counseling do not stop taking this medicine without the doctor’s advice; do not take indigestion remedies at the same time; take the tablet whole preferably after food

PHENYTOIN

Injection, 50mg/ml (2ml) NRH/RRH/DH

Tablet, 100mg NRH/RRH/DH/BHU

Therapeutic group antiepileptics

Indications all forms of epilepsy except absence seizures

Cautions breastfeeding; reduce dose in hepatic impairment; benefit in pregnancy outweighs any risk

Interactions see appendix 1

Side effects GI disturbances including constipation; CNS symptoms including ataxia and confusion; Stevens-Johnson syndrome; visual disturbances (diplopia) are often associated with peak plasma concentrations. Generalized erythematous rash occasionally, gingival hypertrophy and many other symptoms have been reported with high doses

Dose by oral administration, ADULT, initially 100-200 mg 1-2 times daily, increased slowly to usual dose of 800-1200mg daily in divided doses; in some cases, 1600-2000mg daily may be needed; ELDERLY reduce initial dose; CHILD (in divided doses) up to 1 year, CHILD 100-200mg/day; CHILD 1-5 years, 200-400mg/day; CHILD 5-10 years, 400-600mg/day; CHILD 10-15 years, 600-1000mg/day; status epilepticus: by slow IV injection or infusion, ADULT,
15mg/kg loading dose (not more than 50mg/min); **maintenance**: by slow IV or oral, 100mg every 6-8 hours; CHILD, 15mg/kg loading dose

**Counseling** continue the treatment until advised to stop; take the tablets immediately after food; may cause drowsiness; if affected, do not drive or operate machinery

**LAMOTRIGINE**

Tablet, 50mg NRH/RRH

**Therapeutic group** antiepileptics

**Indications** monotherapy and adjunctive treatment of partial seizures and primary and secondarily generalised tonic-clonic seizures; seizures associated with Lennox-Gastaut syndrome

**Cautions** closely monitor (including hepatic, renal and clotting function) and consider withdraw if rash, fever, or other signs of hypersensitivity syndrome develop; avoid abrupt withdrawal (taper off over 2 weeks or longer) unless serious skin reactions occurs

**Interactions** see under appendix 1

**Side effects** rash (see skin reactions below); hypersensitivity syndrome (possibly including rash, fever, lymphadenopathy, hepatic dysfunction, blood disorders, disseminated intravascular coagulation and multi-organ dysfunction); nausea, vomiting, diarrhoea, hepatic dysfunction; headache, fatigue, dizziness, sleep disturbances, tremor, movement disorders, agitation, confusion, hallucinations; blood disorders (including leucopenia, thrombocytopenia, pancytopenia); lupus erythematosus-like effect; photosensitivity; diplopia, blurred vision, conjunctivitis; **serious skin reactions** (including Stevens-Johnson syndrome and toxic epidermal necrolysis) frequently reported in children; most rashes occur in the first 8 weeks; rash is sometimes associated with hypersensitivity syndrome; consider withdrawal if rash or signs of hypersensitivity syndrome develop

**Dose**

**monotherapy**: by oral administration, initially 25mg daily for 14 days, increase to 50mg daily for further 14 days, and then increase by max of 50-100mg daily every 7-14 days; usual maintenance as monotherapy, 100-200mg daily in 1-2 divided doses (up to 500mg); CHILD under 12 years, not recommended; **adjunctive therapy with valproate**: by oral administration, initially 25mg every other day for 14 days then 25mg daily for further 14 days, thereafter increase by max of 25-50mg daily every 7-14 days; usual maintenance dose, 100-200mg daily in 1-2 divided doses; CHILD 2-12 years, initially 150 mcg/kg daily for 14 days (those weighing under 13 kg may receive 2mg on alternate days for the first 14 days) then 300 mcg/kg daily for further 14 days, thereafter increased by maximum of 300 mcg/kg daily every 7-14 days; usual maintenance 1-5 mg/kg daily in 1-2 divided doses; **adjunctive therapy (with enzyme inducing) without valproate**: by oral administration, initially 50mg daily for 14 days then 50mg twice daily for further 14 days, thereafter increase by max. of 100mg daily every 7-14 days; usual maintenance 200-400mg daily in 2 divided doses (up to 700mg daily); CHILD 2-12 years, initially 600 mcg/kg in 2 divided doses for 14 days, then 1.2 mg/kg daily in 2 divided doses for further 14 days, thereafter increased by maximum of 1.2mg/kg daily every 7-14 days; usual maintenance 5-15 mg/kg daily in 2 divided doses

**Counseling** seek medical attention if rash or signs of symptoms of hypersensitivity syndrome develop

**LEVETIRACETAM**

Tablet, 500mg NRH

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Therapeutic group: antiepileptic

Indications: monotherapy and adjunctive treatment of partial seizures with or without secondary generalization; adjunctive therapy of myoclonic seizure and primary generalized tonic-clonic seizures

Cautions: renal and hepatic impairment; pregnancy and lactation; patient undergoing haemodialysis; avoid abrupt withdrawal

Interactions: see appendix 1 under anti-epileptics

Side effects: nausea, vomiting, dyspepsia, diarrhoea, abdominal pain and anorexia; drowsiness, somnolence, asthenia, depression, insomnia, anxiety, aggression and irritability; tremor, ataxia, amnesia, myalgia, thrombocytopenia, pruritus, rash

Dose: monotherapy for partial seizures with or without secondary generalization: by oral administration, ADULT and CHILD over 16 years, initially 250mg twice daily, increasing according to response to 500mg twice daily after 2 weeks; max. 3g/day; CHILD 4-15 years or body weight over 50kg, initially 10mg/kg twice daily; ADOLESCENT 16yrs and above or >50kg, initially 500mg twice daily; adjunctive therapy in partial seizure, myoclonic seizure, and general tonic-clonic seizure: by oral administration, ADULT and CHILD over 12 years or body weight over 50kg, 500mg twice daily, adjusted in steps of 500mg twice daily every 2-4 weeks; CHILD 12-18 years or body weight over 50kg, initially 10mg/kg twice daily, adjusted in steps of 10mg/kg twice daily every 2 weeks; max. 30mg/kg twice daily

Counseling: do not drive or operate machineries; this medicine is to be taken whole after meals preferably

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GABAPENTIN

Tablet 300mg

Therapeutic group: antiepileptics; antineuropathic

Indications: monotherapy and adjunctive treatment of partial seizures with or without secondary generalization; neuropathic pain

Cautions: history of psychosis; renal impairment; elderly; pregnancy and breastfeeding; diabetes mellitus; avoid abrupt withdrawal

Interactions: antacids containing aluminium and magnesium salts may reduce absorption from gastrointestinal tract

Dose: epilepsy: by oral administration, ADULT, 300 mg by mouth on the first day of treatment, 300 mg twice daily on the second day, and 300 mg three times daily on the third day; thereafter the dose may be increased in increments of 300 mg daily every 2-3 days until effective antiepileptic control is achieved which is usually within the range of 0.9 to 3.6g daily; maximum daily dose: 3.6g; CHILD 6 to 12 years, 10 mg/kg on the first day of treatment, 20 mg/kg on the second day, and 25 to 35 mg/kg on the third day; neuropathic pain: by oral administration, ADULT over 18 years, 300mg on the first day, 300 mg twice daily on the second day, and 300 mg three times daily on the third day; thereafter the dose may be increased in increments of 300 mg daily in every 2-3 days; max. 3.6g

Counseling: take consistently at the same time of the day; continue until advised to stop

9. Antiparkinson medicines

LEVODOPA + CARBIDOPA
Tablet, (250mg + 25mg)  
**Therapeutic group** antiparkinson medicines  
**Indications** idiopathic and post-encephalitic parkinsonism, but not medicine-induced extra-pyramidal symptoms  
**Contraindications** closed-angle glaucoma  
**Cautions** pregnancy, breast feeding, elderly patients, post-encephalitic cases, pulmonary disease, peptic ulceration, diabetes mellitus, patients with affective disorders, and those with cerebral or coronary vascular disease; urine may give false positive test for ketones; avoid rapid dose increase and abrupt withdrawals  
**Interactions** see appendix 1 under levodopa  
**Side effects** dose-dependent effects are common, especially gastric intolerance (adjust dose, take after food, use antiemetic if necessary), postural hypotension at the start of treatment and abnormal involuntary movements. Serious dysrhythmias and a wide range of psychiatric conditions may be seen; in over dosage, monitoring and treatment of dysrhythmias is particularly important  
**Dose by oral administration**, ADULT, initially 100-125mg 3-4 times daily, adjust according to response; maintenance dose 750-1500mg daily in divided doses  
**Counseling** take with or after food; it may colour your urine  

**TRIHEXYPHENIDYL**  
Tablet, 2mg  
**Therapeutic group** antiparkinson (antimuscarinic medicines)  
**Indications** parkinsonism, medicine-induced extrapyramidal symptoms  
**Contraindications** untreated urinary retention, closed angle glaucoma, GI obstruction  
**Cautions** cardiovascular disease, hepatic or renal impairment; elderly; avoid abrupt discontinuation of treatment  
**Interactions** see appendix 1 under antimuscarinic  
**Side effects** dry mouth, GI disturbances, dizziness, blurred vision, less commonly urinary retention, tachycardia, hypersensitivity, nervousness; mental confusion, excitement and psychiatric disturbances in some susceptible patients (at high doses)  
**Dose by oral administration**, 1mg daily gradually increased; usual maintenance dose 5-15mg daily in 3-4 divided doses (max of 20mg daily); ELDERLY, lower end of the range  

10. Muscle relaxants and anticholinesterase inhibitors  
10.1. Centrally acting  

**BACLOFEN**  
Tablet, 10mg  
**Therapeutic group** muscle relaxant (centrally acting)  
**Indications** muscle spasticity of cerebral and spinal origin  
**Side effects** transient drowsiness, dizziness, weakness, fatigue  
**Cautions** reduce dose in impaired renal function, avoid abrupt withdrawal (hallucinations and seizures may occur); pregnancy  
**Contraindications** children below 12 years
Dose by oral administration, ADULT, 5 mg three times daily; dose may be increased by 5mg/dose every 3 days (max. daily dose 80mg)  

Counseling: avoid taking with alcohol and other CNS depressants

10.2. Peripherally acting

Non-depolarizing Muscle relaxants: they are also known as competitive muscle relaxants. They compete with the acetylcholine for receptor sites at the neuromuscular junction and their action may be reversed with anticholinesterase such as neostigmine.

Depolarizing muscle relaxants: they act by mimicking acetylcholine at the neuromuscular junction but hydrolysis is much slower than acetylcholine; depolarising is therefore prolonged resulting in neuromuscular blockade. Unlike the non-depolarizing muscle relaxants, its action cannot be reversed and recovery is spontaneous; anticholinesterases such as neostigmine potentiate the neuromuscular block.

10.2.1. Non-depolarising muscle relaxant

ATRACURIUM BESYLATE

Injection, 10mg/ml (2.5ml) NRH/RRH

Therapeutic group non-depolarising muscle relaxant (benzylisoquinolinium)

Indications muscle relaxation (short to intermediate duration) for surgery or during intensive care

Cautions allergic cross-reactivity between neuromuscular blocking agents has been reported; caution is advised in cases of hypersensitivity to these medicines. Their activity is prolonged in patients with myasthenia gravis and in hypothermia, therefore lower doses are required; resistance may develop in patients with burns who may require increased doses

Side effects benzylisoquinolinium non-depolarising muscle relaxants are associated with histamine release, which can cause skin flushing, hypotension, tachycardia, bronchospasm and rarely, anaphylactic reactions; most amino steroid muscle relaxants produce minimal histamine release

Dose intubation: by IV injection, 0.8mg/kg; maintenance: 0.5mg/kg, a top up of dose of 0.2mg/kg body as required

Note: atracurium undergoes non-enzymatic metabolism which is independent of liver and kidney function, thus allowing its use in patients with hepatic or renal impairment

VECURONIUM

Injection, 4mg/ml (2ml) NRH/RRH

Therapeutic group non-depolarising muscle relaxant (amino steroid)

Indication muscle relaxation (intermediate duration) for surgery

Cautions allergic cross-reactivity between neuromuscular blocking agents has been reported; caution is advised in cases of hypersensitivity to these medicines. Their activity is prolonged in patients with myasthenia gravis and in hypothermia, therefore lower doses are required. Resistance may develop in patients with burns who may require increased doses; low plasma cholinesterase activity in these patients requires dose titration for mivacurium.

Side effects duration is prolonged in hypothermia, hypothyroidism, and myasthenia gravis and in conjunction with aminoglycosides. The effect is slightly prolonged in renal and liver diseases.
Dose intubation: by IV injection, 0.1mg/kg; maintenance, 0.03 mg/kg 0.03mg/kg body as required

10.2.2 Depolarising muscle relaxant

**SUXAMETHONIUM**

Injection, 50mg/ml (2ml) NRH/RRH

**Therapeutic group** depolarising muscle relaxant

**Indications** suxamethonium is a depolarizing, short-acting muscle relaxant, which is ideal for intubation; repeated doses can be given to allow longer procedures

**Contraindications** hyperkalaemia, patients with burns; neuropathic or bed ridden patients, known malignant hyperpyrexia, known hypersensitivity and known atypical plasma pseudo-cholinesterase enzymes

**Cautions** pregnancy; patients with cardiac, respiratory or neuromuscular disease; raised intraocular pressure; severe sepsis

**Side effects** repeated dosing may lead to a paradoxical prolonged non-depolarizing effect; partial and temporary reversal with neostigmine may be possible, but ventilation must be controlled and monitored until spontaneous breathing is fully re-established; patient may experience muscular pain following recovery from anaesthesia

**Dose by IV injection**, 1-1.5mg/kg body weight

10.3 Cholinesterase inhibitors

**NEOSTIGMINE**

Injection, 0.5mg/ml (1ml) NRH/RRH/DH

**Therapeutic group** muscle relaxants

**Indications** to counteract the effect of non-depolarising muscle relaxants administered during surgery

**Contraindications** known hypersensitivity and mechanical obstruction of the intestinal or urinary tract

**Cautions** adequate ventilation must be maintained and complete recovery must be ensured before the patient is transferred to the ward

**Interactions** see appendix 1

**Side effects** nausea and vomiting increase salivation, diarrhoea, abdominal cramps, cardiac dysrhythmias, syncope and hypotension; progressive paralysis may occur; management is by artificial ventilation and IV atropine

**Dose by IV bolus**, 0.05mg/kg body weight in combination with atropine 0.025mg/kg body weight

11.1 Medicines used in psychotic disorders

**CHLORPROMAZINE**

Injection, 25mg/ml (2ml) NRH/RRH/DH

Tablet, 100mg NRH/RRH/DH

**Therapeutic group** psychotherapeutic medicines

**Indications** psychosis, mania, agitation, violent behaviour; also, nausea and vomiting, intractable hiccup, vertigo
Contraindications bone marrow depression, closed-angle glaucoma, and coma due to CNS depressants

Cautions cardiovascular and cerebrovascular disorders; respiratory disease; parkinsonism; epilepsy; acute infections, pregnancy; renal impairment (avoid if severe); hepatic impairment (avoid if severe); history of jaundice; leukopenia (monitor blood counts if unexplained fever or infection occur); hypothyroidism, myasthenia gravis; prostatic hypertrophy; angle-closure glaucoma; the elderly (particularly in very hot or very cold weather; reduce dose); avoid abrupt withdrawal; patients should remain supine and blood pressure monitored for 30 minutes after intramuscular injection (risk of hypotension)

Interactions see appendix 1 under anti-psychotics

Side effects extrapyramidal symptoms and on prolonged administration, occasionally potentially irreversible tardive dyskinesias; hypothermia (occasionally pyrexia), drowsiness, apathy, pallor, nightmares, dizziness, excitement, insomnia, headache, confusion, depression; more rarely, agitation, EEG changes, convulsions, and nasal congestion; anticholinergic symptoms including dry mouth, constipation, blurred vision, and difficulty in micturition; hypotension, tachycardia, and arrhythmias; respiratory depression; menstrual disturbances, galactorrhoea, gynaecomastia, impotence, weight gain; sensitivity reactions such as agranulocytosis, leukopenia, leukocytosis, haemolytic anaemia, photosensitization, contact sensitization and rash, jaundice, and alterations in liver function; neuroleptic malignant syndrome; lupus erythematosus-like syndrome; corneal and lens opacities, and purplish pigmentation of the skin, cornea, and retina (with prolonged high dosage); intramuscular injection may be painful and cause hypotension and tachycardia (see precautions) and nodule formation

Withdrawal withdrawal of antipsychotic medicines after long-term therapy should always be gradual and closely monitored to avoid the risk of acute withdrawal syndromes or rapid relapse

Dose by oral administration, ADULT, 25mg 3 times daily (or 75mg at night); normal maintenance dose 75-300mg daily, maximum (psychosis) 1 g daily; CHILD 1-5 years, 0.5mg/kg 6 hourly, maximum 40mg daily; CHILD 6-12 years, 1/3 to 1/2 adult dose, maximum 75mg daily; ELDERLY: 1/3 to 1/2 adult dose; intractable hiccup: 25-50mg 3-4 times daily; by deep IM injection, ADULT, 25-50mg 3-4 times daily; CHILD, dose same as by oral administration

Counseling: tablet should not be crushed and solution should be handled with care owing to the risk of contact sensitization; the medication may cause drowsiness; avoid alcohol

HALOPERIDOL

Injection, 5mg/ml (1ml) NRH/RRH/DH

Therapeutic group psychotherapeutic medicines

Indications psychosis, mania, agitation, violent behavior

Contraindications bone marrow depression, closed-angle glaucoma, coma due to CNS depressants, Parkinsonism

Cautions cardiovascular and cerebrovascular disease, respiratory disease, parkinsonism, epilepsy, pregnancy and breast-feeding, history of jaundice; caution in elderly patients who are susceptible to postural hypotension and to hyper- and hypothermia in very hot or very cold weather

Interactions see appendix 1 under antipsychotics
**FLUPHENAZINE DECANOATE**

**Injection**, 25mg/ml  
**Therapeutic group** psychotherapeutic medicines

**Indications** see under dose

**Contraindications** antipsychotic medicines may be contraindicated in comatose states, CNS depression, and phaeochromocytoma. Most antipsychotics are best avoided during pregnancy, unless essential and it is advisable to discontinue breastfeeding during treatment

**Cautions**: antipsychotics should be used with caution in patients with hepatic impairment, renal impairment, cardiovascular disease, Parkinson’s disease (may be exacerbated by antipsychotics), epilepsy (and conditions predisposing to epilepsy), depression, myasthenia gravis, prostatic hypertrophy, or a personal or family history of angle-closure glaucoma (avoid chlorpromazine, pericyazine and prochlorperazine in these conditions). Caution is also required in severe respiratory disease and in patients with a history of jaundice or who have blood dyscrasias (perform blood counts if unexplained infection or fever develops). Antipsychotics should be used with caution in the elderly, who are particularly susceptible to postural hypotension and to hyper- or hypothermia in very hot or cold weather. Serious consideration should be given before prescribing these medicines for elderly patients. As photosensitisation may occur with higher dosages, patients should avoid direct sunlight.

**Interactions** see appendix 1 under antipsychotics

**Side effects** see notes above on chlorpromazine; also insomnia, agitation, anxiety, headache, drowsiness, impaired concentration, fatigue, blurred vision,
constipation, nausea and vomiting, dyspepsia, abdominal pain, hyperprolactinaemia (with galactorrhoea, menstrual disturbances, amenorrhoea, gynaecomastia), sexual dysfunction, priapism, urinary incontinence, tachycardia, hypertension, rash, rhinitis; cerebrovascular accidents, neutropenia and thrombocytopenia have been reported; rarely, seizures, hyponatraemia, abnormal temperature regulation, oedema

**Dose psychoses:** *by oral administration*, ADULT, 2 mg in 1-2 divided doses on first day then 4 mg in 1-2 divided doses on second day (slower titration appropriate in some patients); usual dose range 4-6 mg daily; doses above 10 mg daily only if benefit considered to outweigh risk (max. 16 mg daily); ELDERLY (or in hepatic or renal impairment), initially 500 mcg twice daily increased in steps of 500 mcg twice daily to 1-2 mg twice daily; CHILD under 15 years not recommended; **mania:** *by oral administration*, ADULT, initially 2 mg once daily, increased if necessary in steps of 1 mg daily; usual dose range 1-6 mg daily; ELDERLY (or in hepatic or renal impairment) initially 500mcg twice daily increased in steps of 500mcg twice daily to 1-2 mg twice daily

**OLANZAPINE**

Tablet, 10mg

**Therapeutic group** psychotherapeutic medicines

**Indications** schizophrenia

**Contraindications** angle-closure glaucoma; breast-feeding

**Cautions** see under fluphenazine; also pregnancy, prostatic hypertrophy, paralytic ileus, hepatic impairment, renal impairment, diabetes mellitus (risk of exacerbation or ketoacidosis), low leucocyte or neutrophil count, bone marrow depression, hypereosinophilic disorders, myeloproliferative disease, parkinson's disease, increased appetite, raised triglyceride concentration, oedema

**Interactions** see appendix 1 under antipsychotics

**Side effects** mild, transient antimuscarinic effects; drowsiness, speech difficulty, exacerbation of parkinson's disease, akathisia, asthenia, increased appetite, raised triglyceride concentration, oedema, hyperprolactinaemia (but clinical manifestations rare)

**Dose schizophrenia, combination therapy for mania, preventing recurrence in bipolar disorder:** *by oral administration*, ADULT over 18 years, 10 mg daily adjusted to usual range of 5-20 mg daily; doses greater than 10 mg daily only after reassessment; max 20mg daily

**Note:** when one or more factors are present that might result in slower metabolism (e.g. female gender, elderly, non-smoker) consider lower initial dose and more gradual dose increase

**QUETIAPINE**

Tablet, 50mg

**Therapeutic group** psychotherapeutic medicine (atypical)

**Indications** schizophrenia; treatment of episodes of mania either alone or with mood stabilizers

**Contraindications** breastfeeding

**Caution** should be used with caution in hepatic or renal impairment; cardiovascular disease or other conditions predisposing to hypotension, with cerebrovascular disease; pregnancy

National Essential Medicines Formulary 2016
Interactions increased risk of drowsiness and postural hypotension when used with alcohol; should be used with caution with medicines that cause significant prolongation of QT interval

Side effects constipation, dyspepsia, dry mouth; somnolence and dizziness; mild asthenia, anxiety, fever, rhinitis, peripheral oedema, and raised liver enzyme values are also relatively common; orthostatic hypotension associated with dizziness, reflex tachycardia

Dose schizophrenia: by oral administration, ADULT, initially 25mg twice daily on day 1, 50mg twice daily on day 2, 100mg twice daily on day 3, 150mg twice daily on day 4; usual dose range: 300-450mg daily; max dose: 750 mg daily; ELDERLY, initially 25mg daily, increase in step of 25-50mg daily in 2 divided dose; CHILD, 12-18 years initially 25mg twice daily, adjusted in steps of 25-50mg according to response; mania: 50mg twice daily on day 1, 100mg twice daily on day 2, 150mg twice daily on day 3, 200mg twice daily on day 4; usual dose range: 400-800mg daily in 2 divided dose, max up to 800mg; ELDERLY, initially 25mg daily as a single dose, increased in steps of 25-50mg daily; CHILD under 18 years, not recommended for mania

11.2 Medicines used in mood disorder

AMITRIPTYLINE
Tablet, 25mg NRH/RRH/DH
Therapeutic group psychotherapeutic medicines
Indications depression with agitation or insomnia, anxiety, chronic daily headache and neuropathic pain
Contraindications recent myocardial infarction, heart block, mania, severe liver disease and children
Cautions diabetes, heart disease with arrhythmia, epilepsy, pregnancy (use only if potential benefit outweighs risk), breast feeding, elderly, hepatic impairment, thyroid disease, co-existing psychosis, closed-angle glaucoma, urinary retention; upon completion of treatment, the medicine should be slowly withdrawn

Interactions see appendix 1 under anti-depressants, tricyclic

Side effects drowsiness and dry mouth, blurred vision, constipation and urinary retention; patients should be encouraged to continue with the treatment, as some side effects will decrease after use

Dose: by oral administration, ADULT, 50-75mg (ELDERLY and ADOLESCENT- start at 25-50mg) daily in divided doses, or as a single dose at bedtime; increase gradually as necessary; usual maintenance dose: 50-100mg daily, maximum 150-200mg daily; nocturnal enuresis: CHILD 7-10 years, 10-20mg; CHILD 11-16 years, 25-50mg at night; max period of treatment (including gradual withdrawal) 3 months; full physical examination should be done before further course

FLUOXETINE
Tablet, 20mg NRH/RRH/DH

Indications see under dose
Cautions see notes above, under chlorpromazine
Contraindications see under chlorpromazine
Side effects possible changes in blood sugar, fever, neuroleptic malignant syndrome-like event; also reported (no causal relationship established)
abnormal bleeding, aplastic anaemia, cerebrovascular accident, ecchymosis, eosinophilic pneumonia, GI haemorrhage, haemolytic anaemia, pancreatitis, pancytopenia, thrombocytopenia, thrombocytopenic purpura, vaginal bleeding on withdrawal, violent behavior; hair loss also reported

**Dose depressive illness**: by oral administration, 20 mg once daily increased after 3 weeks if necessary; usual dose 20-60 mg (ELDERLY 20-40 mg) once daily; max. 80 mg (elderly max. 60 mg) once daily; **obsessive-compulsive disorder**: by oral administration, initially 20 mg once daily increased after two weeks if necessary, usual dose 20-60 mg (ELDERLY 20-40 mg) once daily; max. 80 mg (ELDERLY max. 60 mg) once daily; discontinue if no improvement within 10 weeks; **CHILD and ADOLESCENT** under 18 years not recommended

VENLAFAXINE

Tablet (extended release), 75mg NRH/RRH

Therapeutic group serotonin/noradrenaline reuptake inhibitor; antidepressant

**Indications** moderate to severe depressive illness generalized by anxiety disorder, social anxiety, panic disorder and attention deficit disorder

**Contraindications** <18 years; uncontrolled hypertension, high risk of serious ventricular arrhythmia, electrolyte disturbance; pregnancy and lactation

**Cautions** moderate to severe hepatic and renal impairment; history of MI, bleeding disorder; epilepsy, angle closure glaucoma.

**Interactions** see appendix 1

**Side effects** constipation, nausea, dizziness, dry mouth, insomnia, suicidal ideation, nervousness, drowsiness; asthenia, headache, sexual dysfunction, sweating, anorexia, weight changes; diarrhoea, dyspepsia, vomiting, abdominal pain, hypertension, palpitation, vasodilation, changes in serum cholesterol, chills, pyrexia, dyspnoea, abnormal dreams, agitation, confusions, anxiety, hypertension, paraesthesia, tremor, urinary frequency, menstrual disturbance, mydriasis, tinnitus, hypotension, postural hypotension, alopecia, Steven-Johnson syndrome

**Dose depression and generalized anxiety**: by oral administration, 37.5-75mg once a day initially, may be increased by 75mg/day every 4 to 7 days; not to exceed 225mg/day; **anxiety**: by oral administration, 75mg/day; **panic disorder**: by oral administration, 37.5mg/day for 7 days, then 75mg/day; may be further increased by 75 mg/day every 7 days; not to exceed 225mg/day; **attention deficit disorder**: by oral administration, 18.75-75mg/day; may be increased to 150mg/day after 4 weeks; **dosing modification in renal impairment**; mild to severe renal impairment: reduce dose by 25 to 50%; mild to moderate hepatic impairment: reduce dose by 50%

**Counseling** to be taken after food

11.3 Anxiolytics

DIAZEPAM

Injection, 5mg/ml (2ml) NRH/RRH/DH/BHU
Tablet, 5mg NRH/RRH/DH/BHU

Therapeutic group anxiolytics

National Essential Medicines Formulary 2016
Indications anxiety, insomnia, status epilepticus, pre-operative use and febrile surgeries

Contraindications respiratory depression, phobic or obsessional states, chronic psychosis

Cautions babies born to mothers who have received regular diazepam may have respiratory depression and may become dystonic and hypo-thermic; use during breast feeding may cause drowsiness in the baby; continuous use as a hypnotic may lead to dependence, and sudden withdrawal may cause symptoms. IV injection may cause thrombophlebitis, and extravasation can cause skin necrosis

Interactions see appendix 1 under anxiolytics

Side effects and Overdosage drowsiness and light-headedness, persisting until next day; confusion and ataxia in the elderly; amnesia, vertigo and hypotension may occur; apnoea occasionally follows IV use; overdosage results in a long period of sleep, and supportive measures only are indicated

Dose by oral administration, ADULT: 2.5-5mg 3 times daily or 5-15mg at bedtime; night terrors and somnambulism: CHILD, 1-5mg at bedtime; by IV injection, ADULT: 10-20mg at a rate of 1ml/minute; CHILD, 0.2-0.3mg/kg

LORAZEPAM

Tablet, 1mg NRH

Therapeutic group antiepileptics; psychotherapeutics

Indications short-term use in anxiety or insomnia, status epilepticus

Contraindications see under diazepam

Cautions see under diazepam

Side effects see under diazepam

Dose anxiety: by oral administration, ADULT, 1–4 mg daily in divided doses; ELDERLY (or debilitated) half the adult dose; insomnia associated with anxiety: by oral administration, 1-2 mg at bedtime; CHILD, not recommended

12. Anti-infective medicines

12.1. Anthelmintics

ALBENDAZOLE

Tablet (Chewable), 400mg NRH/RRH/DH/BHU

Therapeutic group intestinal anthelmintics

Indications single or mixed intestinal parasite infestation caused by roundworms, pinworm, whipworm, threadworm, hookworm, and strongyloides-stercoralis, as adjunct to surgery in hydatid cysts caused by Echinococcus granulosus or E. multilocularis, or primary treatment if surgery not possible

Contraindications pregnancy before twelve weeks

Cautions liver function tests and blood counts before treatment and twice during each cycle (prolonged treatment)

Interactions fatty meal increases the absorption of albendazole

Side effects GI disturbances, headache, dizziness, increase in liver enzymes, reversible alopecia

Dose roundworms, pinworm, whipworm and hookworm infestations: by oral administration, ADULT and CHILD above 2 years, 400mg as a single dose; strongyloides & tapeworm infestation: by oral administration, ADULT and
CHILD above 2 years, 400mg/day for 3 days; **E. Granulosus:** by oral administration, ADULT and CHILD above 2 years, 10mg/kg per day for 4-8 weeks; **neurocysticercosis:** 400mg twice daily for 30 days; CHILD 1-2 years, half the adult dose; **hydatid cyst:** ADULT (more than 60kg), 400 mg twice daily for 28 days; repeat after two weeks for up to 3 cycles; ADULT (less than 60 kg) and CHILD less than 6 years: 7.5 mg/kg twice daily (max. 400mg) per dose for 28 days; repeat after two weeks for up to 3 cycles

**Counseling** tablet should be crushed thoroughly and washed down with water; patients should be advised to take it in empty stomach, if single dose; for systemic infestation such as neurocysticercosis, it may be taken with food for better absorption

**NICLOSAMIDE**

Tablet, 500mg

**Therapeutic group** intestinal anthelmintics

**Indications** tapeworm infestation

**Cautions** in chronic constipation, a laxative should be given the night before treatment, or a purgative 2 hours after the medication

**Side effects** light-headedness, pruritus and mild gastro-intestinal disturbances may occur

**Dose by oral administration,** **Taenia solium:** ADULT and CHILD over 6 years, 2g as a single dose on empty stomach followed by magnesium sulphate solution after 2 hours; CHILD under 2 years, 500mg; CHILD 2-6 years, 1000mg; **Taenia saginata** and **Diphyllobothrium latum:** as above but half of the dose on empty stomach and remainder one hour later followed by a purgative 2 hours after last dose; **Hymenolepis nana:** ADULT and CHILD over 6 years, 2g as a single dose on first day and then 1g daily for 6 days; CHILD under 2 years, 500mg on first day and then 250mg daily for 6 days; CHILD 2-6 years, 1g on first day, then 500mg daily for 6 days

**Counseling:** tablets should be chewed thoroughly (or crushed) before washing down with water

12.2. Antibacterials

12.2.1 Penicillin

**AMOXICILLIN**

Scored tablet/capsule, 250mg

Syrup, 125mg/ml (60ml)

**Therapeutic group** antibacterial (penicillin)

**Indications** urinary tract infections, otitis media, sinusitis, PID, cholera, cholecystitis, peritonitis, bronchitis, pneumonia, dental abscess and other infections depending on culture sensitivity report

**Contraindications** penicillin hypersensitivity

**Cautions** history of allergy; renal impairment; erythematous rashes are common in patients with infectious mononucleosis, chronic lymphatic leukaemia and glandular fever

**Side effects** nausea, vomiting, diarrhea, rash

**Dose by oral administration,** ADULT, 250-500mg 8 hourly, doubled in severe infections; CHILD up to 10 years, 125 to 250 mg every 8 hours; for those under 40 kg: 20 to 40 mg/kg daily in divided doses every 8 hours, or 25 to 45 mg/kg
daily in divided doses every 12 hours; INFANTS less than 3 months old, the maximum dose should be 30 mg/kg daily in divided doses every 12 hours

Counseling complete the full prescribed course

AMPICILLIN

Injection, 500mg/vial NRH/RRH/DH/BHU

Therapeutic group antibacterial (penicillin)

Indications board spectrum antibiotic; serious infections with sensitive organisms for conservative treatment of appendicitis, urinary tract infections, endocarditis, meningitis, peritonitis, cholecystitis, pneumonia, septicaemia, otitis media, sinusitis, chronic bronchitis, invasive salmonellosis

Contraindications penicillin hypersensitivity

Cautions history of allergy; renal impairment; erythematous rashes are common in patients with infectious mononucleosis, chronic lymphatic leukaemia and HIV

Side effects nausea, vomiting, diarrhoea, rashes (discontinue treatment)

Dose endocarditis: by IV injection, ADULT 2g 4 hourly; CHILD, 50mg/kg; meningitis: by IV injection, ADULT 2g 4 hourly; NEONATE 50mg/kg 6 hourly; CHILD 3-12 years, 100mg/kg 6 hourly (max 12g daily); septicaemia: by IV injection 500mg every 4-6 hours; CHILD under 10 years, half the adult dose; NEONATE, 25mg/kg 8 hourly; peritonitis and cholecystitis: by IV injection, 500mg 6 hourly; pneumonia: by IV injection, NEONATE: 30mg/kg 12 hourly; 4 months-5 years, 200mg/kg daily divided 6 hourly

BENZATHINE BENZYPenicillin

Injection, 2.4 g (24 lakh units) NRH/RRH/DH/BHU

Therapeutic group antibacterial (penicillin)

Indications syphilis, prophylaxis of rheumatic fever, group A streptococcal pharyngitis

Contraindications penicillin hypersensitivity

Cautions allergy (a test dose should be given), renal impairment, pregnancy, breastfeeding and in hypertensive patients as it contains sodium

Dose by deep IM injection, primary syphilis: 2.4g on two successive days; late syphilis: 2.4g weekly for 3 weeks; prophylaxis of rheumatic fever: 1.2g 3 weekly (<10 years: half dose); congenital syphilis (for infants born to seropositive mothers): 50000 IU/kg as a single dose

Dose equivalent: 600 mg = 1 million units

Penicillin V (phenoxymethylpenicillin)

Tablet 250mg NRH/RRH/DH/BHU

Therapeutic group antibacterial (penicillin)

Indications streptococcal infections; tonsillitis, otitis media, erysipelas; pharyngitis caused by pneumococci and streptococci, gingivostomatitis, pneumococcal infections

Contraindications penicillin hypersensitivity

Cautions history of allergy; renal impairment

Side effects hypersensitivity reactions, including urticaria, fever, joint pains.; anaphylactic shock in hypersensitive patients

National Essential Medicines Formulary 2016
Dose by oral administration, ADULT: 250-500mg 6 hourly; CHILD under 1 year: 62.5mg 6 hourly; 1-5 years: 125mg 6 hourly; 6-12 years: 250mg 6 hourly

Counseling take the tablets at least half an hour before food; complete the full course

**PROCaine BENzyLPENICILLIN**

Injection, 3g (10ml) NRH/RRH/DH/BHU

Therapeutic group antibacterial (penicillin)

Indications syphilis and other penicillin-sensitive infections

Contraindications penicillin hypersensitivity

Cautions allergy (a test dose should be given to all patients); renal impairment

Side effects sensitivity reactions, including urticaria, fever, joint pains; anaphylactic shock in hypersensitive patients

Dose by IM injection, ADULT, 6 lakh units 1-2 times daily; CHILD, 0.25-0.5 lakh units/kg/day to maximum of 6 lakh units; some children and infants may require up to 1 lakh unit/kg body weight in divided doses, depending on the type and severity of infection; syphilis: 1.2 million IU daily

**BENZYLPENICILLIN (penicillin G)**

Injection, 3g (50 lakh units) NRH/RRH/DH/BHU

Therapeutic group antibacterial (penicillin)

Indications meningococcal, pneumococcal meningitis, throat infections, otitis media, streptococcal endocarditis, osteomyelitis and pneumonia

Contraindications penicillin hypersensitivity; avoid intrathecal route

Cautions renal impairment; history of allergy

Side effects hypersensitivity reactions, including urticaria, fever, joint pains and rashes; anaphylactic shock in hypersensitive patients

Dose by slow IV injection or infusion, ADULT, 2 million units 4 hourly; CHILD, 1.5-2 lakhs/kg/day 4 hourly (max 20 million units) per day; bites and peritonitis: by slow IV injection, 10 lakh units 6 hourly; neurosyphilis: by slow IV injection, 1.2-2.4 million IU 4 hourly

**CLOXACILLIN**

Capsule, 250mg NRH/RRH/DH

Injection, powder for reconstitution 250mg NRH/RRH

Therapeutic group antibacterial (anti-staphylococci); osteomyelitis, septic arthritis, staphylococcal endocarditis, meningitis, brain abscess, cellulitis, paronychia nail infection

Indications infections due to penicillinase-producing staphylococci

Contraindications penicillin hypersensitivity, jaundice in neonates

Cautions history of allergy; renal impairment, hepatic disease

Side effects hypersensitivity reactions, including urticaria, fever, joint pains, anaphylactic shock in hypersensitive patients

Dose osteomyelitis, septic arthritis, and staphylococcal endocarditis: by slow IV injection or infusion, ADULT, 2g 6 hourly; CHILD, 50mg/kg; brain abscess and meningitis: by slow IV injection or infusion, 2g 4 hourly; cellulitis and paronychia nail infection: by oral administration, 250-500mg orally 6 hourly
Counseling  

**take the medicine at least half an hour before food; complete the full course**

### 12.2.2 Cephalosporins

#### CEPHALEXIN

<table>
<thead>
<tr>
<th>Tablet, 250mg</th>
<th>NRH/RRH</th>
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**Therapeutic group** antibacterial (cephalosporin)

**Indications** sensitive infections like urinary tract infections, skin and soft tissue infections, bone infections, biliary tract infections, intra-abdominal infections etc

**Contraindications** cephalosporin hypersensitivity

**Cautions** penicillin hypersensitivity; renal impairment; false positive urinary glucose if tested for reducing substances; false positive Coombs’ test

**Interactions** see appendix 1 under cephalosporin.

**Side effects** diarrhoea, colitis, nausea and vomiting; allergic manifestations including rashes, pruritis and urticaria, also fever, arthralgia and anaphylaxis; abdominal discomfort, headache, erythema multiforme, toxic epidermal necrolysis; disturbances in liver enzymes, transient hepatitis and cholestatic jaundice

**Dose by oral administration**
- ADULT: 500mg 12 hourly
- CHILD under 1 year: 125mg 12 hourly
- CHILD 1-5 years: 125mg 8 hourly
- CHILD 6-12 years: 250mg 8 hourly; doses should be doubled in severe infections

#### CEPHAZOLIN

<table>
<thead>
<tr>
<th>Injection, 500mg</th>
<th>NRH/RRH</th>
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**Therapeutic group** antibacterial (2nd generation cephalosporin)

**Indications** respiratory and genito-urinary tract infections that do not respond to penicillins, skin and soft tissue, bone and joint infections, septicaemia, surgical prophylaxis and endocarditis

**Contraindications** see under cephalexin

**Cautions** see under cephalexin

**Interactions** see appendix 1 under cephalosporin

**Side effects** see under cephalexin

**Dose by IM or IV injection**
- ADULT: 500 to 1000mg every 6-12 hours
- CHILD: 25-50mg/kg daily in divided doses, increased to 100mg/kg daily in severe infections

#### CEFTRIAXONE

<table>
<thead>
<tr>
<th>Injection, 1g</th>
<th>NRH/RRH</th>
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**Therapeutic group** antibacterial (3rd generation cephalosporin)

**Indications** meningitis, pneumonia, septicaemia and gonorrhoea

**Contraindications** see under cephalexin

**Cautions** see under cephalexin

**Interactions** see appendix 1 under cephalosporin

**Side effects** see under cephalexin; in neonates and preterm infants, displaces bilirubin from albumin and increases risk of encephalopathy
Dose by deep IM or IV injection over at least 2-4 minutes, or by IV infusion, 1g daily; 2-4 g daily in severe infections; IM doses over 1g should be divided between more than one site; NEONATE, by IV infusion over 60 minutes, 20-50 mg/kg daily (max. 50 mg/kg daily); CHILD under 12 years, by deep IM injection, or by IV injection over 2-4 minutes, daily in severe infections; doses of 50 mg/kg and over by IV infusion only; uncomplicated gonorrhoea: by deep IM injection, 250 mg as a single dose.

**CEFOTAXIME**

Injection, 1g

**Therapeutic group** antibacterial (3rd generation cephalosporin)

**Indications** infection due to sensitive gram-positive and gram-negative bacteria; surgical prophylaxis; haemophilus epiglottitis, gonorrhoea and meningitis; preferred in neonate and preterm over ceftriaxone

**Contraindications** see under cephalexin

**Cautions** see under cephalexin

**Interactions** see appendix 1 under cephalosporin

**Side effects** see under cephalexin

**Dose by IM or IV injection**, ADULT 1g every 12 hours, increased up to 12g daily in 3-4 divided doses in severe infections; NEONATE 50mg/kg daily in 2-4 divided doses increased to 150-200mg/kg daily in severe infections; CHILD 100-150mg/kg daily in 2-4 divided doses, increased up to 200mg/kg daily in very severe infections; **gonorrhoea**: 1000mg as a single dose

**CEFIXIME**

Tablet, 200mg

**Therapeutic group** antibacterial (3rd generation cephalosporin)

**Indications** treatment of infections caused by sensitive organisms including upper respiratory tract infections, otitis media, pharyngitis, uncomplicated gonorrhoea and uncomplicated urinary tract infection

**Contraindications** hypersensitivity to cephalosporins

**Cautions** sensitivity to beta-lactam antibacterial, renal impairment; pregnancy and breast feeding

**Interactions** see appendix 1

**Side effects** see under cephalexin

**Dose by oral administration**, respiratory tract infection: ADULT, 400mg/day in single daily dose or in two divided dose; otitis media, pharyngitis/tonsillitis, uncomplicated UTI: 400mg/day in single daily dose or in 2 divided dose in every 12 hours; CHILD, 6-12 months, 8mg/kg/day in single daily dose or in two divided dose every 12 hours; not to exceed 400mg/day; CHILD >12 years, 400mg/day in single dose or in two divided dose every 12 hours; **dosing modification**: renal impairment; CrCl 21-60mL/min: 260mg/day; CrCl <20mL/min: 200mg/day

12.2.3 Aminoglycosides

**GENTAMICIN**

Injection, 40mg/ml (2ml)

**Therapeutic group** antibacterial (aminoglycosides)
Indications gram-negative septicaemia and neonatal sepsis; meningitis and other CNS infections; biliary tract infection, acute pyelonephritis or prostatitis, endocarditis caused by strep. viridans or Strep. faecalis (with penicillin) and surgical prophylaxis

Contraindications myasthenia gravis

Cautions pregnancy; renal impairment, infants, the elderly; avoid prolonged use (beyond 7 days) and high doses in these groups

Interactions see appendix 1 under aminoglycosides

Side effects vestibular and auditory damage, reversible nephrotoxicity, antibiotic associated colitis

Dose by slow IM or IV injection, endocarditis: 1mg/kg 8 hourly; endocarditis (culture negative): ADULT, 4 to 6 mg/kg daily; CHILD <10 years, 7.5mg/kg; CHILD ≥ 10 years, 6mg/kg; necrotising fasciitis or synergistic gangrene and peritonitis: 4-6mg/kg IV daily; surgical prophylaxis: by IV injection,2mg/kg ; pneumonia in children: NEONATE (birth to 1 month), 2.5 to 3mg/kg IV (< 30 weeks gestation) or 3.5 mg/kg (> 30 weeks gestation) IV, daily; septicaemia:5mg/kg daily (in divided doses every 8 hours)

AMIKACIN SULPHATE

Injection, 250mg (2ml) NRH/RRH

Therapeutic group antibacterial (aminoglycosides)

Indications serious gram negative infections resistant to gentamicin

Contraindications see under gentamicin

Cautions see under gentamicin; amikacin affects auditory functions to greater extent than gentamicin

Interactions see appendix 1 under aminoglycosides

Side effects see under gentamicin

Dose by IM or slow IV injection, ADULT, 15mg/kg daily in 2 divide doses, increased to 22.5mg/kg daily in 3 divided doses in severe infections; max. 1.5g daily for up to 10 days (max. cumulative dose 15 g); CHILD, 15mg/kg daily in 2 divided doses; NEONATE, loading dose of 10 mg/kg then 15 mg/kg daily in 2 divided doses

12.2.4 Fluoroquinolones

CIPROFLOXACIN

Injection, 2mg/ml (100ml) NRH/RRH/DH
Tablet, 500mg NRH/RRH/DH

Therapeutic group antibacterial (fluoroquinolones)

Indications typhoid fever, proven to be resistant to all other conventional medicines; gastroenteritis including cholera, shigellosis, pseudomonal meningitis, gonorrhoea, RTI, UTI, bone and joint infections, septicaemia and skin infections

Contraindications history of convulsive disorders; avoid during pregnancy and lactation

Cautions renal and hepatic impairment; strong sunlight exposure (photosensitivity); false positive urinary glucose if tested for reducing substances; not recommended in children or growing adolescents

Interactions see appendix 1 under quinolones
Side effects nausea, vomiting, diarrhoea, dyspepsia, abdominal pain, dizziness, headache, restlessness; rashes, pruritis; more serious CNS effects (including convulsions); muscle and joint pains, liver and kidney damage and blood disorders.

Dose by oral administration, ADULT, 250-750mg 12 hourly daily; by IV infusion, 200-300mg 12 hourly daily; CHILD, (not recommended, but where benefit outweigh risk), by oral administration, 10-30mg/kg daily in two divided doses or by IV infusion, 8-16mg/kg daily in two divided dose.

Counseling stay out of bright sunlight while taking this medicine; take plenty of fluids.

NORFLOXACIN

Tablet, 400mg NRH/RRH

Therapeutic group antibacterial (fluoroquinolones)

Indications urinary tract infections not responding to other conventional medicines; infectious diarrhoea.

Contraindications hypersensitivity to quinolones, children, pregnancy, convulsions.

Cautions lactation, moderate renal impairment; history of convulsions, do not exceed the recommended dose; ensure adequate hydration, urinary output.

Interactions see appendix 1 under quinolones.

Side effects nausea, vomiting, heart burn, constipation/diarrhoea, headache, dizziness, depression, insomnia and seizures, rashes, dry mouth, fever, arthralgia, elevated liver enzymes, urea and creatinine, neutropenia, thrombocytopenia and anaemia, visual disturbances.

Dose by oral administration, urinary tract infections: 400mg 12 hourly daily for 7-10 days (for 3 days in uncomplicated lower urinary tract infections); complicated UTI: 400mg 12 hourly for 10-14 days; chronic relapsing urinary tract infections: 400mg twice daily for 12 weeks; may be reduced to 400mg once daily if adequate suppression within first 4 weeks; chronic prostatitis: 400mg twice daily for 30 days.

Counseling see under ciprofloxacin.

12.2.5 Other antibacterial

CHLORAMPHENICOL

Injection, powder for reconstitution (1g) NRH/RRH/DH

Capsule, 250mg NRH

Therapeutic group antibacterial

Indications typhoid fever, Strep. Pnuemoniae, meningitis, epiglottitis, sepsicaemia, cerebral abscess, mastoiditis.

Contraindications pregnancy, breast feeding (bone marrow toxicity in infant).

Cautions blood counts required before and during treatment; reduce dosage in liver or renal impairment; may cause “grey baby” syndrome in neonates.

Interactions see appendix 1.

Side effects blood disorder including reversible and irreversible aplastic anaemia may occur; peripheral and optic neuritis, hypersensitivity reactions, erythema multiforme, nausea, vomiting and diarrhoea.

Dose by oral administration or IV injection or infusion, ADULT, 500mg-1g every 6 hours; CHILD over 1 year: 50-100mg/kg/day; CHILD 2 weeks-1 year,
50mg/kg/day in 4 divided doses; INFANT under 2 weeks, 25mg/kg daily in 4 divided doses; never give IM as absorption is erratic; switch to oral, if patient can swallow

Note this medicine has life-threatening side effects and its use is justified in serious situations only; there should be good clinical or laboratory reasons of suspecting typhoid fever before it is used in PUO (pyrexia of unknown origin)

**Grey Syndrome:** vomiting, greenish diarrhoea, abdominal distension, hypothermia, pallid cyanosis, irregular respiration and circulatory collapse

**SULPHAMETHOXAZOLE + TRIMETHOPRIM (COTRIMOXAZOLE)**

<table>
<thead>
<tr>
<th>Tablet, (400mg + 80mg)</th>
<th>NRH/RRH/DH/BHU</th>
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**Therapeutic group** antibacterial (sulphonamides)

**Indications** upper respiratory infections, urinary tract infection, pneumonia and treatment of PCP in HIV/AIDS

**Contraindications** pregnancy (1st trimester), babies under 6 weeks old, renal or hepatic failure, jaundice, blood disorders, known sensitivity to sulphonamides

**Cautions** adequate fluid intake must be maintained to prevent crystallization in the urine; renal impairment, breastfeeding, and elderly patients all demand care or re-consideration of the choice of medicine; photosensitivity may occur

**Interactions** see appendix 1 under cotrimoxazole

**Side effects** nausea, vomiting, rashes and blood disorders

**Dose by oral administration**, ADULT, 960 mg twice daily, increased to 3 tablet twice daily in severe infections; CHILD over 5 years, 480mg twice daily; CHILD over 6 months to 5 years, 240mg twice daily; CHILD over 6 weeks to 6 months, 120mg twice daily; prophylaxis of pneumocystis jerovici pneumonia in HIV patients: 960mg once daily

**Counseling** drink plenty of fluids with this medicine; complete the full course

Note in case of bacillary dysentery, oral rehydration remains the first requirement of treatment; mild cases may be prolonged by antibiotic treatment

**DOXYCYCLINE**

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<tr>
<th>Tablet/capsule, 100mg</th>
<th>NRH/RRH/DH/BHU</th>
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**Therapeutic group** antibacterial (tetracycline)

**Indications** infections caused by chlamydia, sinusitis, acne vulgaris, malaria, pelvic inflammatory disease, rosacea, chronic prostatitis.

**Contraindications** pregnancy, breast feeding, children under 12 years, systemic lupus erythematosus

**Cautions** hepatic impairment, antacids, aluminium, zinc, calcium, iron, magnesium salts and milk and milk products reduces the absorption of tetracycline

**Interactions** see appendix 1 under tetracycline

**Side effects** nausea, vomiting, diarrhoea (antibiotic-associated colitis reported occasionally), dysphagia, and oesophageal irritation

**Dose by oral administration**, ADULT, 200mg on the first day, then 100mg daily thereafter; severe infections, 200mg daily; early syphilis: 100mg 2 times daily for 14 days; late latent syphilis: 200mg two times daily for 30 days; uncomplicated genital chlamydia, non-gonococcal urethritis: 100mg two times daily for 7 days (14 days in PID)
Counseling take this medicine with plenty of fluid during meal to reduce gastric irritation; avoid exposure of skin to direct sunlight; do not take indigestion remedies or medicines containing iron or zinc at the same time of day as this medicine; complete the full course

**ERYTHROMYCIN STEARATE**

Tablet, 250mg NRH/RRH/DH

**Therapeutic group** antibacterial (macrolides)

**Indications** treatment of penicillin-sensitive infections in patients allergic to Penicillin, also *Campylobacter enteritis*, pneumonia, syphilis, chronic prostatitis, acne vulgaris; treatment of *Chlamydia trachomatis* during pregnancy and breastfeeding where doxycycline is contraindicated

**Contraindications** severe hepatic impairment

**Cautions** hepatic and renal impairment, pregnancy and breastfeeding

**Interactions** see appendix 1

**Side effects** nausea, vomiting, abdominal discomfort, diarrhoea (antibiotic-associated colitis reported); urticaria, rashes and other allergic reactions; reversible hearing loss reported after large doses; cholestatic jaundice, cardiac effects; the estolate salt causes jaundice

**Dose by oral administration**, ADULT, 250-500mg orally 6 hourly; CHILD < 2 years, 125mg 6 hourly; 2-8 years, 250mg 6 hourly; > 8 years, 250-500mg 6 hourly (or 30-50mg/kg daily in 4 divided doses)

**CLARITHROMYCIN**

Tablet, 250mg NRH

**Therapeutic group** macrolides

**Indications** treatment of peptic ulcer disease as a part of 2 or 3 medicines combination regimen

**Contraindications** hypersensitivity to macrolides; history of QT prolongation and cholestatic jaundice; co-administration with medicines which cause QT prolongation and statins

**Caution** renal impairment; pregnancy

**Side effects** GI disturbances including abnormal taste, nausea, abdominal pain, dyspepsia; headache, dizziness, anxiety; hepatitis, elevated liver function tests, jaundice; leucopenia, neutropenia, pancreatitis; QT prolongation, seizures; rashes, Stevens-Johnson syndrome

**Dose by oral administration**, ADULT, 250-500mg two to three times daily; CHILD, 15mg/kg/day twice daily

**NITROFURANTOIN**

Tablet, 100mg NRH/RRH/DH

**Therapeutic group** antibacterial

**Indications** urinary tract infections caused by *E. coli*. Enterococci, *S. aureus*, *Klebsiella sp.*, *Enterobacter sp.*, and *Proteus sp.*

**Contraindications** impaired renal function and neonates

**Cautions** in long-term therapy, monitor lung function and liver function; false positive urinary glucose if tested for reducing substances; urine may be coloured
yellow or brown; use with caution in anaemia, electrolyte imbalance, and vitamin B and folate deficiency

**Side effects** anorexia, nausea, vomiting and diarrhoea are common; pulmonary reactions and peripheral neuropathy may occur; urticarial rash and pruritis and many other side effects have been noted

**Dose treatment**: By oral administration. ADULT, 50-100mg 6 hourly; CHILD over 3 months, 3mg/kg daily in 4 divided doses, 100mg every 6 hour for 7 days in severe chronic recurrent infection; **prophylaxis**: ADULT, 50-100mg at night; CHILD over 3 months, 1mg/kg at night

**Counseling** take this medicine regularly as instructed; take some food or snack with every dose to avoid nausea and vomiting; do not worry if your urine changes colour

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**VANCOMYCIN**

Injection, 500mg

Therapeutic group antibacterial

**Indications** prophylaxis and treatment of endocarditis and other serious infections caused by gram-positive cocci

**Contraindications**: risk-benefit should be considered when hypersensitivity and severe renal function impairment exists

**Cautions**: avoid rapid infusion; rotate infusion sites; renal impairment (appendix 3); elderly; avoid if history of deafness; all patients require plasma-vancomycin measurement (after 3 or 4 doses if renal function normal, earlier renal impairment), blood counts, urinalysis, and adrenal function tests; monitor auditory function in elderly or if renal impairment; pregnancy (appendix 4) and breast feeding (appendix 5); interactions; appendix 1 (vancomycin)

**Side effects** nephrotoxicity including renal failure and interstitial nephritis; ototoxicity (discontinue if tinnitus occurs); blood disorders including neutropenia (usually after 1 week or cumulative dose of 25g), rarely agranulocytosis and thrombocytopenia; nausea; chills, fever; eosinophilia, anaphylaxis, rashes (including exfoliative dermatitis, Stevens-Johnson syndrome, toxic epidermal necrolysis, and vasculitis); phlebitis (irritant to tissue); on rapid infusion, severe hypotension (including shock and cardiac arrest), wheezing, dyspnoea, urticaria, pruritis, flushing of the upper body (red man syndrome), pain and muscle spasm of back and chest

**Dose** by IV infusion, ADULT 500mg every 6 hours or 1g every 12 hours; CHILD, 20mg/kg 12 hourly

**Note** plasma concentration monitoring required; pre-dose (trough) concentration should be 5-10mg/L (10-15 mg/L in endocarditis)

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**12.2.3 Antileprosy medicines**

**DAPSONE**

Tablet, 50mg

Therapeutic group antileprosy medicines; antimalarial medicines

**Indications** leprosy, as part of multi-medicine therapy

**Contraindications** porphyria

**Cautions** cardiac or pulmonary disease, anaemia (treat before starting dapsone therapy), pregnancy (give folate supplements); on long-term treatment, patients and their carers should be told how to recognise signs of blood disorders and
advised to seek immediate medical attention if symptoms such as rash, fever, sore throat, mouth ulcers, bruising or bleedings occur

Interactions see appendix 1

Side effects neuropathy; allergic dermatitis; anorexia, nausea, vomiting, headache, insomnia; anaemia, agranulocytosis; hepatitis; these are dose-related, and uncommon at current recommended doses

Dose by oral administration, 1-2 mg/kg daily

RIFAMPICIN

Tablet, 300mg and 150mg NRH/RRH

Therapeutic group antileprosy and antituberculosis medicines

Indications leprosy, tuberculosis

Contraindications jaundice

Cautions hepatic impairment (reduce dose), pregnancy (risk of neonatal bleeding may be increased); advice patients on oral contraceptives to use additional contraceptives during treatment

Interactions see appendix 1

Side effects GI symptoms including anorexia, nausea, vomiting, diarrhoea, headache, drowsiness

Dose by oral administration: tuberculosis: 450-600mg daily, as part of combination therapy; leprosy: 600mg once monthly, as part of multi-medicine therapy; CHILD (both diseases): 105mg/kg daily

Counseling take all this medicine regularly as instructed until advised to stop; urine and saliva may become red-coloured; take half to one hour before food

Note hepatic disorders: patients and their carers should be told how to recognize signs of liver disorder, and advise to seek immediate medical attention if symptoms such as persistent nausea, vomiting, malaise or jaundice develop

CLOFAZIMINE

Capsule, 50mg and 100mg NRH/RRH/DH

Therapeutic group antileprosy

Indications multibacillary leprosy, as part of multi-medicine therapy; type II leprosy reactions (erythema nodosum leprosum)

Cautions hepatic and renal impairment, pregnancy and breastfeeding, avoid if persistent abdominal pain and diarrhoea

Side effects nausea, vomiting, abdominal pain, headache, tiredness

Dose by oral administration: treatment: 300mg once monthly and 50mg daily between monthly doses; ENL Reactions: up to 300mg daily for a maximum of 3 months; CHILD 6-12 years: ½ ADULT dose; CHILD under 6 years: 1/4 ADULT dose

Counseling take all this medicine regularly as instructed until advised to stop; you may find that your urine and saliva become red-coloured; take with or after food

12.2.4. Antituberculosis medicines

As per the National Guideline for Management of Tuberculosis, basic principles of TB treatment include administration of combination of medicines to kill different bacterial populations; for right duration, in right dosages to achieve therapeutic but not toxic effect. TB treatment has been standardized so that all
patients in a defined group receive the same treatment regime. Fixed dose combinations (FDCs) are available for treatment of both new and re-treatment cases. Single formulations are to be reserved in case patients develop serious adverse effects to FDCs.

**4-FDC (HRZE)**

Tablet, (75mg+150mg+400mg+275mg) NRH/RRH/DH

**Therapeutic group** antituberculosis medicines

**Indications** treatment of tuberculosis (intensive phase)

**Side effects** nausea, vomiting, loss of appetite; as for individual medicine components

**Contraindications** if allergic to any of these medicines in the combination; medicine induced liver diseases

**Counseling** take the medicine half to one hour before food and preferably at the same time of the day consistently; reassure if patient complains of mild intolerance such as nausea and loss of appetite

**3-FDC (HRZ)**

Tablet, (50mg+75mg+150mg) NRH/RRH/DH

**Therapeutic group** antituberculosis

**Indications** treatment of tuberculosis (intensive phase) in pediatric patients

**Side effects** nausea, vomiting, loss of appetite; as for individual medicine components

**Contraindications** allergy to any of the medicine in the combination; hepatic and renal impairment, epilepsy, history of psychosis, alcohol dependence, malnutrition, diabetes

**Counseling** take the medicine half to one hour before food and preferably at the same time of the day consistently; reassure if patient complains of mild intolerance such as nausea and loss of appetite

**3-FDC (HRE)**

Tablet, (75mg+150+275mg) NRH/RRH/DH

**Therapeutic group** antituberculosis

**Indications** treatment of tuberculosis in continuation phase for retreatment cases

**Side effects** nausea, vomiting, loss of appetite; as for individual medicine components

**Contraindications** allergy to any of the medicine in the combination; hepatic and renal impairment, epilepsy, history of psychosis, alcohol dependence, malnutrition, diabetes

**Counseling** take the medicine half to one hour before food and preferably at the same time of the day consistently; reassure if patient complains of mild intolerance such as nausea and loss of appetite

**2-FDC (RH)**

Tablet, (150mg+ 75mg) NRH/RRH/DH
Tablet (60mg + 60mg) NRH/RRH/DH
Tablet (75mg + 50mg) NRH/RRH/DH

**Therapeutic group** antituberculosis

**Indications** treatment of tuberculosis (continuation phase)
Side effects as for individual medicine components

Contraindications allergy to any of the medicines in the combination; hepatic and renal impairment, epilepsy, history of psychosis, alcohol dependence, malnutrition, diabetes. Isoniazid is not advisable during pregnancy or for those suffering from alcoholism or liver disease and jaundice; lactating mother

Interactions rifampicin accelerates the metabolism of several medicines, including oral anticoagulants, oral contraceptives, glucocorticoids, digitoxin, quinidine, methadone, ART, macrolides, azole, antifungals, hypoglycemic, and barbiturates; no interactions by isoniazid as such

Side effects nausea and vomiting, skin rash, psychotic problems, depression, seizures, peripheral neuropathy may develop by isoniazid; red or orange urine by rifampicin

Dose given according to the weight band; refer Guidelines for the Management of Tuberculosis

ISONIAZID

Tablet, 100mg and 300mg

Therapeutic group antituberculosis

Indications tuberculosis in combination with other medicines

Contraindications medicine induced liver disease

Cautions hepatic and renal impairment, epilepsy, history of psychosis, alcohol dependence, malnutrition, diabetes

Interactions see appendix 1

Side effects nausea, vomiting, constipation, dry mouth, peripheral neuritis with high dose, optic neuritis, convulsions

Dose ADULT: 300mg daily; CHILD: 4-6mg/kg daily to a maximum of 300mg; refer Guidelines for the Management of Tuberculosis

STREPTOMYCIN

Injection, 1g

Therapeutic group antituberculosis

Indications tuberculosis (initial phase of re-treatment cases with HRE)

Contraindications pregnancy, myasthenia gravis

Cautions renal impairment; infants and the elderly

Side effects tinnitus, vertigo and deafness may precede permanent vestibular damage: reversible nephrotoxicity

Dose ADULT: 1g daily IM, but use 750mg or 500mg in patients under 50kg or over 40 years old; CHILD: 15-20mg/kg daily IM; refer Guidelines for the Management of Tuberculosis

ETHAMBUTOL

Tablet, 400mg

Therapeutic group antituberculosis

Indications used to replace a medicine that is causing toxicity or intolerance; or to be added to the normal combination treatment if medicine resistance is suspected

Contraindications optic neuritis, poor vision
Cautions reduce dose in renal impairment and creatinine clearance less than 30ml/minute; elderly and pregnancy

Side effects optic neuritis, reversible if medicine withdrawn promptly: peripheral neuritis, red/green colour blindness, pruritis, urticaria, and thrombocytopenia

Dose ADULT and CHILD over 6 years: 15-25mg/Kg when used in initial phase, 15mg/Kg when used in maintenance phase; refer Guidelines for Management of Tuberculosis

Counseling if you get any trouble with your eyes while on this medicine, stop immediately and report to the hospital; do not stop this treatment unless the doctor advises you so

**PYRAZINAMIDE**

Tablet, 500mg NRH/RRH

Therapeutic group antituberculosis

Indications tuberculosis (in combination with other medicines)

Contraindications liver damage

Cautions impaired hepatic function, diabetes, pregnancy, and gout (avoid in acute attack)

Side effects hepatitis, jaundice, and liver failure; nausea, vomiting, and arthralgia; anaemia, urticaria

Dose ADULT, 2g daily, reducing to 1.5g in patients under 50kg; CHILD, 35mg/kg daily; refer National TB guideline

Counseling take all this medicine regularly as instructed as well as the other medicines you have been given; seek medical attention if there are signs of liver disorder: persistent nausea, vomiting, malaise or jaundice

**KANAMYCIN**

Injection, 500mg NRH

Therapeutic group antituberculosis

Indications medicine-resistant tuberculosis, in combination with other medicines

Contraindications pregnancy; myasthenia gravis

Cautions renal impairment; infants and elderly; avoid prolonged use (beyond 7 days) and high doses in these groups

Side effects vestibular damage, nephrotoxicity

Dose by IM injection, ADULT, 250mg 6-hourly or 500mg 12-hourly; By IV injection, 15-30mg/Kg daily in divided doses every 8-12 hours

**ETHIONAMIDE**

Tablet, 250mg NRH

Therapeutic group antituberculosis

Indications medicine-resistant tuberculosis, in combination with other medicines

Contraindications severe liver disease; serious neurological or psychiatric disease

Cautions epilepsy, psychiatric symptoms

Side effects nausea, vomiting, liver damage, neuropathy, mental disturbance
Dose by oral administration, ADULT, 500-750mg daily in divided doses; CHILD, 12mg/Kg daily to a maximum of 500mg

Counseling take all this medicine regularly as instructed, as well as the other medicines you have been taking

**RIFAMPICIN**

Tablet, 300mg and 150mg

Therapeutic group antileprosy; antituberculosis

Indications leprosy, tuberculosis

For details see rifampicin under antileprosy

Dose: by oral administration, ADULT, tuberculosis: 450-600mg daily, as part of short course therapy; leprosy: 600mg once monthly, supervised (450mg for adults weighing less than 35kg) as part of multi-medicine therapy; CHILD (both diseases): 105mg/kg daily

**CYCLOSERINE**

Tablet, 250mg

Therapeutic group antituberculosis

Indications medicine-resistant tuberculosis (in combination with other medicines)

Contraindications epilepsy, depression, severe anxiety, psychotic states, alcohol dependence, severe renal impairment

Cautions reduce dose in renal impairment; monitor haematological, renal and hepatic function. Pregnancy and breastfeeding

Interactions see appendix 1

Side effects mainly neurological including headache, dizziness, drowsiness, tremor, convulsions, psychosis, depression

Dose by oral administration, ADULT, initially 250mg 12 hourly for 2 weeks, increased up to a maximum of 500mg 12 hourly daily depending on clinical response; CHILD, initially 10mg/Kg daily, adjusted according to clinical response; refer TB guidelines for details

Counseling take all this medicine regularly as instructed, as well as the other medicines you have been given

**LEVOFLOXACIN**

Tablet, 250mg

Therapeutic group antibacterial (fluoroquinolones)

Indications multi-medicine resistant tuberculosis (MMR-TB)

Contraindications hypersensitivity to quinolones

Cautions G-6-PD deficiency, moderate to severe hepatic and renal failure, seizures, pregnancy and breast-feeding exposure to strong sunlight and UV light

Interactions see appendix 1 under quinolones

Side effects see under ciprofloxacin

Dose refer guidelines for the management of multi-medicine resistant TB

Counseling take all medicines regularly as instructed; if it makes you feel ill consult the doctor immediately

**PARA-AMINOSALICYLATE SODIUM (PAS)**
Granules, 60% w/w (4g) (delayed release granules) NRH/RRH

**Therapeutic group** antituberculosis

**Indications** for the treatment of MMR-TB in combination with other medicines

**Contraindications** severe hypersensitivity to amino salicylate sodium and its congeners; patients with severe renal impairment

**Cautions** hypersensitivity reaction (skin rash and fever accompanied by lymphadenopathy, jaundice and hepatitis, leukocytosis, conjunctivitis, headaches and joint pain), pregnancy, breastfeeding, patients who have GI problems, patients with sodium restricted diets

**Interactions** isoniazid; vitamin B12 (reduced absorption); patients on therapy of more than one month should be considered for vitamin B12 substitution

**Side effects** optic neuritis, encephalopathy; GI disorders: nausea, vomiting, abdominal pain; hepatobiliary disorders, jaundice, hepatitis (uncommon)

**Dose**: by oral administration, 10-12gm per day

**Counseling** GI disturbances may be minimized by taking the medicine with or after meals or with an antacid

12.3 Antifungal medicines

**FLUCONAZOLE**

Tablet, 150mg NRH/RRH

**Therapeutic group** antifungal (triazole)

**Indications** treatment of systemic fungal infections including histoplasmosis, coccidioidomycosis, paracoccidioidomycosis and blastomycosis; treatment and, in immunocompromized patients, prophylaxis of cryptococcal meningitis, oesophageal and oropharyngeal candidiasis, vaginal and systemic candidiasis

**Contraindications** hypersensitivity; pregnancy; concurrent use of drugs that cause QT prolongation

**Cautions** hypersensitivity to other azoles; proarrhythmic conditions; hepatic and renal impairment

**Interactions** see under appendix 1

**Side effects** nausea, vomiting, flatulence and diarrhoea; headache, taste disturbances, dizziness, seizure, alopecia pruritus; rash, toxic epidermal necrolysis and Stevens-Johnson syndrome; hyperlipidaemia, leucopenia, thrombocytopenia and hypokalaemia

**Dose** by oral administration, **systemic mycoses**: ADULT, 200mg daily up to 6 months; CHILD over 2 years, 3-6mg/kg daily up to 6 months; **cryptococcal meningitis**: 400mg on Day 1, then 200mg daily for up to 8 weeks; CHILD, 6 - 12 mg/kg daily for up to 8 weeks (every 72 hours in neonate up to 2 weeks old); **prophylaxis of cryptococcal meningitis in immunocompromized patients**: 200mg daily; **systemic candidiasis**, 200mg daily for up to 4 weeks; CHILD, 6-12mg/kg daily (every 72 hours in NEONATE up to 2 weeks old); **oesophageal and oropharyngeal candidiasis**: ADULT, 200mg on Day 1, then 100mg daily for until symptoms resolve; CHILD, 6mg/kg on day 1, followed by 3mg/kg daily (every 72 hours in NEONATE up to 2 weeks old); **vaginal candidiasis**: ADULT, 150mg as a single dose

**GRISEOFULVIN**

Tablet 125mg NRH/RRH/DH

**Therapeutic group** antifungal
Indications fungal infections of skin, scalp, hair and nails, where topical therapy has failed or is inappropriate

Contraindications severe liver disease, lupus erythematosus and related conditions; porphyria and pregnancy

Cautions pregnancy (avoid pregnancy during and for 1 month after treatment; men should not father children within 6 months of treatment); Breastfeeding

Interactions see appendix 1 under antifungals

Side effects headache, nausea, vomiting, rashes, photosensitivity; dizziness, fatigue, leucopenia, systemic lupus erythematosus, erythema multiforme, toxic epidermal necrolysis, peripheral neuropathy, and confusion

Dose by oral administration, ADULT, 500-1000mg daily divided doses or as a single dose; CHILD, 10mg/kg daily in divided doses or as a single dose

Counseling take with or after food; take at regular intervals and complete the full course

Note long courses of treatment are needed (6 weeks for skin; 3 months for nails infections)

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CLOTRIMAZOLE

Ointment, 1% (15g)  
Pessary, 100mg  

Therapeutic group antifungal

Indications susceptible fungal infections of skin and vagina

Side effects occasionally, local irritation or mild inflammation

Dose vaginal candidiasis: pessary, 100mg 2 times a day for 3 nights or 100mg before bed time for 6 days; fungal skin conditions: by topical application (ointment), 2-3 times daily

Counseling pessaries: place the pessary high up the vagina just before you go to sleep; ointment: apply the ointment thinly as instructed; you should continue for 14 days after the skin has healed to be sure the infection does not come back

Note tinea of nails and scalp usually needs systemic treatment

NYSTATIN

Tablet, 500,000 units  
Nystatin oral paste (extemp)  

Therapeutic group antifungal

Indications intestinal and oral candidiasis

Side effects nausea, vomiting and diarrhoea may occur at high doses

Interactions see appendix 1

Dose intestinal candidiasis: by oral administration, ADULT, 500,000 units tablet 4 times daily, double in severe infections; CHILD, 100,000 units 4 times daily; oral thrush: extemporaneously prepared, 4 times daily after food

12.4. Antiprotozoal medicines

12.4.1 Antiamoebic and antiigiardiasis medicines

METRONIDAZOLE
Injection, 5mg/ml (100ml)  
Tablet, 400mg  

Therapeutic group antiprotozoal medicines

Indications anaerobic infections (including dental), protozoal infections, *H. pylori* eradication as a component of triple regimen therapy

Contraindications known hypersensitivity

Cautions disulfiram like reactions with alcohol; hepatic impairment; pregnancy and breastfeeding

Interactions see appendix 1

Side effects nausea, vomiting, unpleasant taste, GI disturbances, rashes, headache, dizziness, ataxia, darkening of urine, erythema multiforme, pruritus, urticaria, angioedema, and anaphylaxis; also reported abnormal liver function tests, thrombocytopenia, aplastic anaemia, myalgia, arthralgia; on prolonged or intensive therapy peripheral neuropathy, transient epileptic form seizures, and leucopenia

Dose by oral administration, anaerobic infections: 400mg 3 times a day for 7-10 days; amoebiasis: 400-800mg 3 times a day for 5-10 days; trichomoniasis: 2g single dose or 200mg 3 times a day for 7 days (treat sexual partners also); giardiasis: 2g once a day for 3 days or 400mg 3 times a day for 5-10 days; bacterial vaginosis: 2g single dose or 500mg 2 times a day for 7 days; anaerobic infections: 500mg 4 times a day for 7 days; acute dental infections: 200mg 3 times a day for 3-7 days; CHILD 7.5mg/kg 3 times a day; *H. Pylori* gastritis: 400mg 2 times a day for 14 days in combination with other medicines; by IV infusion, ADULT, 500mg 8-hourly, CHILD, 7.5mg/kg 8-hourly

Counseling take after food; avoid alcohol during the course of treatment

13.4.2 Antimalarial medicines

(a) Curative treatment

**CHLOROQUINE**

Tablet, 150mg  

Therapeutic group antimalarial

Indications treatment of malaria (*Plasmodium vivax*)

Cautions pregnancy (benefit outweighs the risk), renal and hepatic impairment

Interactions see appendix 1

Side effects headache and GI symptoms occur occasionally; visual disturbances; keratopathy and non-reversible retinopathy can occur; skin reactions, hair loss, and discoloration of skin, nails, and mucous membranes

Dose see appendix 2

Counseling take after food and avoid exposure to direct sunlight

**PRIMAQUINE**

Tablet, 7.5mg  

Therapeutic group antimalarial

Indications adjunct in treatment of *P. falciparum* and *P. vivax* malaria

Cautions G-6-PD deficiency, systemic disease associated with granulocytopenia (e.g. rheumatoid arthritis), pregnancy and breastfeeding

Side effects nausea, vomiting, anorexia and abdominal pain
Dose see appendix 2
Counseling take all the medicine as instructed; use mosquito net to avoid getting bitten by mosquitoes

**QUININE**

Injection, 300mg/ml (2ml) NRH/RRH/DH
Tablet, 200mg NRH/RRH/DH

Therapeutic group antimalarial

Indications chloroquine-resistant *P. falciparum* malaria

Contraindications myasthenia gravis, haemoglobinuria, optic neuritis

Cautions atrial fibrillation, conduction defects, heart block

Interactions see appendix 1

Side effects serious reactions are rare; signs of mild to moderate cinchonism (tinnitus, headache, blurred vision, hearing change, nausea and diarrhoea) often occur after the third day of treatment, but do not mean the treatment should be stopped; overdose may result in tinnitus, deafness, ambyopia, and cardiovascular symptoms; a single oral dose above 3 grams can cause potentially fatal poisoning; much smaller doses can be lethal in children; emesis, gastric lavage, and activated charcoal should be administered; excessive IV infusion can lead to hypotension, heart block, and ventricular fibrillation and hypoglycaemia

Dose see appendix 2

**ARTEMETHER + LUMEFANTRINE (Coartem®)**

Tablet, (20mg + 120mg) NRH/RRH/DH/BHU

Therapeutic group antimalarial

Indication treatment of acute uncomplicated falciparum malaria

Contraindications history of arrhythmias, of clinically relevant bradycardia, and of congestive heart failure accompanied by reduced left ventricular ejection fraction; family history of sudden death or of congenital QT interval prolongation; breastfeeding

Cautions electrolyte disturbances, concomitant use with other medicines known to cause QT-interval prolongation; hepatic impairment, renal impairment, pregnancy, monitor patients unable to take food (greater risk of recrudescence)

Side effects abdominal pain, anorexia, diarrhoea, vomiting, nausea, palpitations, cough, headache, dizziness, sleep disturbances, asthenia, arthralgia, myalgia, pruritus and rashes

Dose see appendix 2

**ARTEMETHER**

Injection, 80mg/ml (1ml) NRH/RRH/DH/BHU

Therapeutic group antimalarial

Indications schizonticidal effect on *P. vivax* and *P. falciparum*

Contraindication hypersensitivity

Cautions pregnancy and lactation

Side effects nausea and vomiting, abdominal pain, reduction in nucleoside and reticulocyte count, bradycardia, 1st degree heart block and transient increase in serum transaminase
DOXYCYCLINE

Tablet/capsule, 100mg

Therapeutic group: tetracycline

Indications: malaria prophylaxis

For detail refer doxycycline under anti-infective medicines

Dose: see appendix 2

Counseling: avoid exposure of skin to direct sunlight or sun lamps

DAPSONE

Tablet, 50mg

Therapeutic group: antimalarial

For detail see dapsone under antileprosy medicines

Dose: see appendix 2

Counseling: take all this medicine regularly as instructed, as well as the other medicines you have been given

12.5 Antiviral medicines

12.5.1 Antiherpes

ACYCLOVIR

Tablet, 400mg

Therapeutic group: antiviral

Indications: systemic treatment of varicella-zoster (chicken pox-shingles) and systemic and topical treatment of herpes simplex infections of skin and mucous membranes (including initial and recurrent genital herpes)

Contraindications: hypersensitivity

Cautions: renal impairment, lactation, pregnancy (use only when benefit outweighs risk), neurological abnormalities, severe hypoxia, hydration with high doses of infusion; maintain adequate hydration (especially with infusion or high doses)

Side effects: rashes, GI disturbances, rise in bilirubin, liver enzymes, blood urea and creatinine, decrease in haematological indices, headache, tremors, agitation, somnolence, fatigue, psychosis, convulsions and coma

Dose by oral administration, non-genital Herpes simplex, initial therapy:

ADULT, 200mg (400 mg in the immunocompromised or if absorption impaired) 5 times daily, usually for 5 days; CHILD under 2 years, half the adult dose; CHILD over 2 years, adult dose; genital herpes simplex, treatment of first episode: 200 mg 5 times daily or 400 mg 3 times daily usually for 5 days (400 mg 5 times daily for 7-10 days in immunocompromised or HIV-positive patients); treatment of recurrent infection: 800 mg 3 times daily for 2 days or 200 mg 5 times daily for 5 days or 400 mg 3 times daily for 3-5 days (400 mg 3 times daily for 5-10 days in immunocompromised or HIV-positive patients); herpes simplex, chronic suppressive therapy: 200-400mg 2-4 times daily for 12 months; varicella and herpes zoster, treatment: ADULT, 800 mg 5 times daily for 7 days; CHILD, varicella, 20 mg/kg (up to 800 mg) 4 times daily for 5 days or under
12.5.2 Medicines for hepatitis B infection

TENOFOVIR

Tablet, 300mg

**Therapeutic group** nucleoside reverse transcriptase inhibitors

**Indications** HIV infection in combination with other antiretroviral medicines; hepatitis B infection

*For details see tenofovir under antiretroviral medicines*

**Dose by oral administration**, 300mg once daily

12.5.3. Antiretroviral Medicines

The national HIV Guideline recommends following combination of medicines as the treatment of choice:

**1st Line regime**: Tenofovir + Lamivudine + Efavirenz

Following alternate first line regime may be considered based on individual patient factors:

- Tenofovir + Lamivudine + Nevirapine
- Zidovudine + Lamivudine + Nevirapine

Currently, fixed dose combinations of Tenofovir, Lamivudine and Efavirenz (3-FDC) and Tenofovir and Lamivudine (2-FDC) are available for use in adults.

**2nd Line regime**: Tenofovir + Lamivudine+ Lopinavir/ritonavir

Second line regime should be considered only when treatment failure with first line regime is established.

*Refer the National Guidelines for Management of HIV/AIDS*

13.5.3.1 Nucleoside Reverse Transcriptase Inhibitors (NRTIs)

**LAMIVUDINE (3TC)**

Tablet, 150mg

**Therapeutic group** nucleoside reverse transcriptase inhibitors

**Indications** HIV infection in combination with at least two other antiretroviral agents

**Contraindications** breastfeeding

**Interactions** see appendix 1 under antivirals

**Side effects** infrequent complications include headache, nausea, diarrhoea, abdominal pain and insomnia, use in pregnancy is extensive and well established, alopecia, class related side effect of lactic acidosis and steatosis are listed but not clear whether it is due to 3TC therapy

**Dose by oral administration**, 150mg 2 times daily

**ZIDOVUDINE (AZT)**

Tablet, 300mg

**Therapeutic group** nucleoside reverse transcriptase inhibitors

**Indications** HIV infection in combination with at least two other antiretroviral agents
Contraindications abnormally low neutrophil counts or haemoglobin values, raised transaminase levels, breast-feeding, neonates with hyper-bilirubinaemia requiring treatment other than phototherapy

Interaction see appendix 1, under antiviral

Side effects bone marrow suppression within 2-3 months (depends on dose and duration of treatment and stage of disease), finger nail discoloration (2-6 weeks), class related lactic acidosis and hepatic steatosis to a lesser extent than other NRTIs, GI intolerance, altered taste, rare dose related myopathy due to mitochondrial toxicity; advocated for pregnant women beyond first trimester to prevent vertical transmission

Dose by oral administration, 300mg 12 hourly (>70kg weight or tolerated) or 200mg 3 times daily

TENOFOVIR (TFV)

Tablet, 300mg

Therapeutic group nucleoside reverse transcriptase inhibitors

Indications HIV infection in combination with other antiretroviral medicines; medicine of choice in Hepatitis B-HIV coinfection

Contraindications treatment should be stopped if there is a rapid increase in aminotransferase concentrations, progressive hepatomegaly or steatosis, or metabolic or lactic acidosis of unknown aetiology; breastfeeding

Cautions to be used with caution and doses modified, in patients with renal impairment; renal function and serum phosphates should be monitored before treatment is started; every 4 weeks during the first year of therapy, and then every 3 months; in patients with a history of renal impairment or who are particularly at risk, more frequent monitoring may be needed

Interactions use with nephrotoxic medicines or with other medicines eliminated by active tubular secretion is not recommended; if such use is unavoidable, renal function should be monitored weekly; use of lopinavir/ritonavir with tenofovir modestly increases the plasma concentrations of tenofovir

Side effects the most common side effects reported are mild GI effects, particularly diarrhoea, nausea and vomiting, abdominal pain, flatulence, dyspepsia, and anorexia; hypophosphatemia, reduced bone density, renal failure, myopathy and nephrogenic diabetes insipidus may occur; other side effects include peripheral neuropathy, headache, dizziness, insomnia, depression, dyspnoea, asthenia, sweating, and skin rashes

Dose by oral administration, 300mg 2 times daily

TENOFOVIR + LAMIVUDINE (2-FDC)

Tablet, (300mg + 300mg)

Therapeutic group nucleoside reverse transcriptase inhibitors

Indications HIV infection in combination with a NNRTI or PI

Contraindications as under individual medicines

Cautions as under individual medicines

Side effects as for individual medicines

Dose by oral administration, ADULT, 1 tablet once daily; CHILD, as per the body weight
12.5.3.2 Non-nucleoside Reverse Transcriptase Inhibitor (NNRTI)

NEVIRAPINE (NVP)

Tablet, 200mg
NRH/RRH

Therapeutic group: non-nucleoside reverse transcriptase inhibitor

Indications: HIV infection in combination with at least two other antiretroviral agents

Contraindications: breastfeeding, severe hepatic impairment and post exposure prophylaxis

Interactions: see appendix 1, under antiviral

Side effects: life threatening cutaneous reactions 3-6% (Stevens-Johnson syndrome), and hepatotoxicity 13% (high CD4), usually during the initial 8 weeks (patient should be warned to report hypersensitivity symptoms: fever, rash 10-16%, arthralgias, or myalgias), maculopapular and erythematous rash

Dose: 200mg daily for the first 14 days, then 200mg 2 times daily

Note: if severe rash or rash with constitutional symptoms develop, therapy should be discontinued. If rash develops within the first 14 days of therapy, dose should not be increased to twice daily.

Therapy should be interrupted in patients who develop moderate to severe liver function test results. Therapy should be reinstated with a 14-day once daily dosing when LFT returns to normal. If LFT recur nevirapine should be discontinued.

EFAVIRENZ (EFV)

Tablet, 600mg
NRH/RRH

Therapeutic group: non-nucleoside reverse transcriptase inhibitor

Indications: HIV infection in combination with at least two other antiretroviral agents

Contraindications: pregnancy and breastfeeding

Interactions: see appendix 1, under antiviral

Side effects: approximately 15-27% develop rash, which is usually morbilliform and does not require discontinuation of the medicine. More severe reactions that require discontinuation are blistering and desquamating rashes (1-2%); CNS (noted in about 52% of patients): dizziness, delusions depression, and bad dreams; false positive urine cannabinoid test, increased aminotransferase levels, contraindicated in pregnancy in the first trimester

Dose: 600mg once daily taken in the evening to reduce CNS side effects that is common in the first 2-3 weeks; body weight <40kg: 400mg once daily (empty stomach)

TENOFOVIR + LAMIVUDINE + EFAVIRENZ (3-FDC)

Tablet, (300mg + 300mg + 600mg)
NRH/RRH

Indications: HIV infection

Contraindications: as under individual medicines

Cautions: as under individual medicines

Side effects: as under individual medicines

Dose by oral administration: ADULT, 1 tablet once daily; CHILD, as per the body weight
Counseling medication compliance is crucial for better treatment outcome; take after meals at regular interval

12.5.3.3 Protease Inhibitors

LOPINAVIR/ RITONAVIR (LPV/r)

Tablet, (200/50mg) NRH/RRH

Therapeutic group protease inhibitor (PI)

Indications post exposure prophylaxis

Contraindications breastfeeding

Side effects diarrhea in 15-25%, nausea and abdominal pain; class side effects: insulin resistance, fat accumulation and hyperlipidaemia; elevated transaminase (SGOT and SGTP)

Interactions see appendix 1, under antiviral

Dose by oral administration, ADULT 12 hourly

13. Antineoplastic and Immunosuppressive medicines

13.1 Immunosuppressant

CYCLOSPORIN (Neoral®)

Capsule, 25mg, 50mg and 100mg NRH

Therapeutic group immunosuppressant

Indications in organ and tissue transplant, prevention of graft rejection following bone marrow, kidney, liver, pancreas, heart and lung transplantation; for prophylaxis and treatment of graft versus host disease

Contraindications uncontrolled hypertension, severe infections and malignancy; reduce dose by 25-50% if serum creatinine more than 30% above baseline

Cautions monitor kidney function, liver function, and blood pressure; measure serum potassium especially in marked renal dysfunction; measure blood lipids before treatment and thereafter as appropriate; pregnancy and breastfeeding

Interactions see appendix 1

Side effects commonly dose dependent increase in serum creatinine and urea during first few weeks; and less commonly renal structural changes on long-term administration

Dose by oral administration, organ transplants (when used alone) ADULTs and CHILD over 3 months, 10-15mg/kg followed by 10-15mg/kg daily for 1-2 weeks post operation; nephrotic syndrome, 5mg/kg daily in 2 divided doses; CHILD 5-6mg/kg daily in 2 divided doses

Note because of differences in bioavailability, care should be taken when switching between different brands of cyclosporin; lower doses are required when used with other immunosuppressants

TACROLIMUS (Pangraf®)

Capsule, 1mg NRH

Therapeutic group immunosuppressant

Indications primary immunosupression in liver and kidney allograft recipients and allograft rejection resistant to conventional immunosuppressive regimens; moderate to severe atopic eczema
Cautions see under cyclosporin; also monitor ECG (important: also echocardiography, see note below), visual status, blood glucose, haematological and neurological parameters

Interactions see appendix 1

Contraindications hypersensitivity to macrolides; pregnancy (exclude before starting; if contraception needed non-hormonal methods should be used, appendix 4); breastfeeding (appendix 5); avoid concurrent administration with cyclosporine (care if patient has previously received cyclosporine)

Side effects GI disturbances; hepatic dysfunction, hypertension (less frequently hypotension), tachycardia, angina, arrhythmias, cardiomyopathy (important see note below); dyspnoea, pleural effusion, tremor, headache, insomnia, paraesthesia, confusion, depression, dizziness, anxiety, convulsions, in coordination, encephalopathy, psychosis; visual and hearing abnormalities; haematological effects; altered acid-base balance and glucose metabolism; altered renal function; hypophosphatemia, hypercalcaemia, hyperuricemia; muscle cramps; pruritus, alopecia, rash, sweating, acne, photosensitivity; susceptibility to lymphoma and other malignancies particularly of the skin.

**Dose by oral administration:**
- **Liver transplantation**, starting 6 hours after transplantation, ADULT, 100-200 mcg/kg daily in 2 divided doses; CHILD, 300 mcg/kg in 2 divided doses;
- **Renal transplantation**, starting within 24 hours of transplantation, 150-300 mcg/kg daily in 2 divided doses; CHILD, 300mcg/kg daily in 2 divided doses

**Note** cardiomyopathy has been reported in children given tacrolimus after transplantation; patients should be monitored carefully by echocardiography for hypertrophic changes; dose reduction or discontinuation should be considered if these occur

**MYCOPHENOLATE MOFETIL** *(Cellcept®)*

Capsule, 250mg and 500mg

**Therapeutic group** immunosuppressant

**Indications** prophylaxis of acute renal, cardiac, or hepatic transplant rejection in combination with cyclosporin and corticosteroids

**Contraindications** pregnancy (exclude before starting and avoid for 6 weeks after discontinuation); breastfeeding

**Cautions** complete blood counts every week for 4 weeks then twice a month for 2 months then every month in the first year (neutropenia warrants interruption of treatment); elderly (increased risk of infection, GI haemorrhage and pulmonary oedema); children (higher incidence of side effects may require temporary reduction of dose or interruption); active serious GI disease (risk of haemorrhage, ulceration and perforation); delayed graft function; increased susceptibility to skin cancer (avoid exposure to strong sunlight)

**Interactions** see appendix 1

**Side effects** diarrhea, vomiting, and abdominal pain, GI ulceration and bleeding; abnormal liver function tests, hepatitis, jaundice, pancreatitis; oedema, tachycardia, hypertension, hypotension, vasodilatation; cough, dyspnoea; insomnia, agitation, tremor, dizziness, headache; influenza-like syndrome infections; hyperglycaemia; renal impairment; increased risk of malignancies, particularly of the skin; blood disorders (including leucopenia, anaemia, thrombocytopenia, pancytopenia), disturbances of electrolytes and blood lipids; arthralgia; alopecia, acne, and rash
Dose by oral administration, renal transplantation: ADULT, 1g twice daily starting within 72 hours of transplantation; CHILD and ADOLESCENT 2-18 years (and body surface over 1.25 m²) 600 mg/m² twice daily (max. 2 g daily); Cardiac transplantation: 1.5 g twice daily starting within 5 days of transplantation

13.2 Cytotoxic medicines

Staff preparing the cytotoxic medicines should be warned about the tissue irritation and potential eye damage that these medicines can cause, and should be provided with appropriate protective attire. Pregnant staff should not handle cytotoxic medicines.

**VINCRISTINE**

Injection, 1mg/ml (1ml) NRH

Therapeutic group cytotoxic

*Indications* chemotherapy of neoplastic disease, alone or in combination with other cytotoxic medicines

*Contraindications* further treatment is contraindicated if motor weakness develops during treatment; breastfeeding; intrathecal injection should not be given

*Cautions* like most cytotoxic medicines, vincristine is teratogenic, and may cause life threatening toxicity; breastfeeding should be discontinued

*Side effects* peripheral and autonomic neuropathy is common, with paraesthesia, loss of ankle jerks, and abdominal bloating; alopecia may occur; nausea and vomiting can usually be controlled with promethazine

*Administration* the injection is best given through the tubing of a freely running IV infusion of dextrose or sodium chloride; extravasation may cause serious tissue necrosis; dosage will depend on the regimen used, especially in combination chemotherapy, on the stage of the disease, and on the age, weight and size of the patient; up to date specialist literature should be consulted, for specific dosage schedule

*Dose by IV infusion*, ADULT, 10 to 30 mcg/kg of body weight or 0.4mg to 1.4mg per square meter of body surface a week as a single dose; CHILD, 1.5 to 2mg/m² a week as a single dose; CHILD > 10kg the initial dose is 50 mcg/kg once a week.

*Note* manufacturer’s literature should be consulted for specific dosage information

**CYCLOPHOSPHAMIDE**

Injection, powder for reconstitution (200mg) NRH

Tablet, 50mg NRH/RRH

Therapeutic group cytotoxic

*Indications* chemotherapy of neoplastic disease, alone or in combination with other cytotoxic medicines; steroid resistant nephrotic syndrome

*Contraindications* known hypersensitivity, severe bone marrow depression, and pre-existing haemorrhagic cystitis; pregnancy and breastfeeding

*Cautions* acute infections should be treated before cyclophosphamide is introduced; like most cytotoxic medicines, cyclophosphamide is teratogenic, and may cause life threatening toxicity; breastfeeding should be discontinued

*Side effects* leucopenia may be severe; alopecia is usually total but reversible; haemorrhagic cystitis occurs in 5-10% of patients, treatment should be withdrawn immediately; vomiting if frequent and on IV treatment,
Dexamethasone and/or diazepam may be needed in addition to an antiemetic; a dose of these medicines should be given before treatment starts and 6 hours afterwards.

**Administration**
The injection is best given through the tubing of a freely running IV infusion of dextrose or sodium chloride; dosage will depend on the regimen used, especially in combination chemotherapy, on the stage of the disease, and on the age, weight and size of the patient.

**Dose by oral administration,** ADULT, 1-5mg/kg/day, to be adjusted on the basis of leucocyte counts; CHILD: induction: 2-8mg/kg/daily in divided doses for 6 or more days; maintenance: 2-5 mg/ kg twice a week; by IV infusion, ADULT, induction: 40-50mg/kg in divided doses over a period of 2-5 days; maintenance: 10-15mg/kg every 7 to 10 days, or 3-5 mg/kg two times a week, or 1.5-3mg/kg per day; CHILD, induction: 2-8mg/kg daily in divided doses for six or more doses (or total dose for seven doses once a weekly); maintenance: 10-15mg/kg every seven to ten days, or 30mg/kg at 3 to 4 week intervals or when bone marrow recovery occurs.

**Counseling**
*Take the tablets on an empty stomach; drink plenty of water with this medicine.*

**Note**
Manufacturer’s literature should be consulted for specific dosage information.

**DOXORUBICIN**

**Injection,** powder for reconstitution (10mg) NRH

**Therapeutic group** cytotoxic

**Indications** chemotherapy of neoplastic disease, alone or in combination with other cytotoxic medicines

**Contraindications** pregnancy; breastfeeding

**Cautions** cardiac status and blood counts be monitored regularly like most cytotoxic medicines; doxorubicin is teratogenic, and may cause life threatening toxicity; breastfeeding should be discontinued.

**Side effects** bone marrow suppression is frequently the dose-limiting factor; leucopenia may improve even if treatment is continued. Cardiomyopathy is serious, but short-term changes in cardiac output at the time of the injection normalise rapidly. Alopecia is to be expected. Vomiting is frequent, and dexamethasone and/or diazepam may be needed in addition to an antiemetic. A dose of these medicines should be given before treatment starts and 6 hours afterwards.

**Administration**
The injection is best given through the tubing of a freely running IV infusion of dextrose or sodium chloride; extravasation may cause serious tissue necrosis; dosage will depend on the regimen used, especially in combination chemotherapy, on the stage of the disease, and on the age, weight and size of the patient.

**Dose by IV infusion,** ADULT, 60-75mg/m², repeated every 21 days, or 25-30mg/ m² a day on 2 or 3 successive days, repeated every 3 to 4 weeks, or 20mg/m² surface once a week; CHILD, 30mg/ m² a day on three successive days every 4 weeks.

**Note**
Great care should be taken to prevent exposure of skin to doxorubicin; any doxorubicin solution that comes in contact with the skin or mucosa should be washed off thoroughly with soap and water.

**FLUOROURACIL (5-FU)**
Injection, 500mg/10ml

**Therapeutic group** cytotoxic

**Indications** chemotherapy of neoplastic disease, alone or in combination with other cytotoxic medicines

**Contraindications** severe bone marrow depression, pregnancy, lactation

**Cautions** reduce dose in severely debilitated patients, following major surgery, or when hepatic, renal or bone marrow function is impaired; blood counts should be performed daily during initial treatment and weekly thereafter; like most cytotoxic medicines, fluorouracil is teratogenic, and may cause life-threatening toxicity; breastfeeding should be discontinued

**Side effects** alopecia may be total; dermatitis and mucositis may occur; nausea and vomiting can usually be controlled with an anti-emetic

**Dose by IV infusion** usually given over 4 hours in 500ml dextrose; extravasations may cause serious tissue necrosis; dosage will depend on the regimen used, especially in combination chemotherapy, on the stage of the disease, and on the age, weight and size of the patient

14. Medicines affecting the blood

14.1. Antianaemia medicines

**IRON DEXTRAN**

Injection, 50mg elemental iron/ml (2ml) NRH/RRH/DH

**Therapeutic group** antianaemia

**Indications** to correct as iron deficiency state that does not warrant transfusion, but when oral therapy has been unsuccessful

**Contraindications** cardiac abnormalities, severe liver disease, acute kidney infections, asthma (IV route)

**Cautions** a test dose of 1ml should be given by IM route and patient kept under observation for 30 minutes; adrenaline injection should be available in case of anaphylaxis.

**Interactions** see appendix 1

**Side effects** staining of the skin in IM injection, arthralgia with acute arthritis and various allergic phenomena following IV infusion

**Dose by deep IM injection**, 1ml following Z technique on the first day, followed by 2ml daily for 10 days; **by deep IM injection**, as a single large dose diluted in 5% dextrose or 0.9% sodium chloride after a 1ml test dose injected over 5 minutes

**FERROUS SULPHATE + FOLIC ACID**

Syrup, ((30mg+500mcg)/5ml)) (150ml) NRH/RRH/DH/BHU

Tablet, (60mg+0.4mg) NRH/RRH/DH/BHU

**Therapeutic group** antianaemia

**Indications** treatment and prevention of iron deficiency states, particularly in pregnancy and lactation, low birth weight infants, menorrhagia, and post-gastrectomy

**Contraindications** anaemias due to causes other than iron deficiency

**Cautions** except in the diagnosis mentioned under indications, anaemia should be investigated thoroughly before treatment; alternatively, a clinical trial of 3
weeks ferrous sulphate tablet can be given, and the situation reviewed, if there is no improvement in the haemoglobin concentration; the presence of hookworm in the stool is justification for a course of iron treatment

Interactions see appendix 1

Side effects and Over dosage GI irritation with vomiting and diarrhoea is common; poisoning with iron can easily occur, and as little as 2g may be fatal to an infant; gastric lavage with a bicarbonate solution inactivates the residue; the treatment is otherwise symptomatic

Dose by oral administration, as tablet, ADULT, therapeutic: 1 tablet 2 to 3 times daily; prophylactic: 1 tablet daily; CHILD, Low birth-weight newborn babies: ¼ tablet daily; as syrup, CHILD, 2mg/kg two to three times daily

Counseling take this medicine after food and take iron rich diet like green vegetables, liver, beef, beans and peaches

FOLIC ACID

Tablet, 5mg NRH/RRH/DH/BHU

Therapeutic group antianaemia

Indications treatment and prevention of folate deficiency states; prophylaxis to prevent neural tube effects

Cautions folic acid should not be administered indiscriminately to patients with megaloblastic anaemia unless vitamin B_{12} is given concurrently; haematological response, particularly the reticulocyte count, should be monitored daily until improvement is seen

Side effects and over dosage: although folic acid, like vitamin B_{12}, produces a beneficial haematological response in patients with pernicious anaemia, it may precipitate or exacerbate neurological damage in this condition when used alone

Dose by oral administration, ADULT, 5mg daily at first for 4 months followed by 5mg once weekly; CHILD up to 1 year, 500mcg/kg daily; CHILD over 1 year, as adult dose; neural tube defect prophylaxis (NTD): 5 mg daily 2-3 months before planning pregnancy and continue up to twelve weeks after conception

VITAMIN B_{12} (hydroxycobalamin)

Injection, 1mg/ml NRH/RRH/DH

Therapeutic group antianaemia

Indications pernicious anaemia; combined degeneration of the spinal cord, other causes of Vitamin B_{12} deficiency, post gastrectomy

Cautions wherever possible, the diagnosis should be firmly established before treatment is started

Dose by IM injection, pernicious anaemia: initially, 1mg repeated 10 times at intervals of 2-3 days, maintenance dose of 1 mg every month; prophylaxis (for strict vegetarians and patients with malabsorption): 1mg IM every two months; CHILD, same dose as adult

14.2. Medicines affecting coagulation

ENOXAPARIN

Injection, 60mg NRH/RRH

Therapeutic group anticoagulant (low molecular weight heparin)
Indications treatment of deep vein thrombosis and pulmonary embolism; prophylaxis of deep vein thrombosis in both surgical and medical patients at risk of thromboembolic complications; prophylaxis of ischemic complication of unstable angina and ST segment elevation myocardial infarction (STEMI)  

Contraindications hypersensitivity; acute bacterial endocarditis, major bleeding disorder, haemorrhagic stroke, drug induced thrombocytopenia  

Cautions renal or hepatic impairment; history of GI ulceration, uncontrolled hypertension, spinal or epidural anaesthesia; lactation and pregnancy; elderly  

Side effects thrombocytopenia, injection site irritation, pain and ecchymoses, skin necrosis; hypersensitivity, erythema, anemia, hemorrhagic complications; atrial fibrillation, pulmonary edema pneumonia and osteoporosis on prolonged use  

Dose by subcutaneous injection, prophylaxis of deep-vein thrombosis in surgical patients: ADULT, 20-40mg, 2 hours before surgery and then 20-40mg every 24 hours for 7 to 10 days; prophylaxis for deep vein thrombosis in medical patients: 40mg (4000 units) every 24 hours for at least 6 days; CHILD<2months: 0.75mg/kg SC every 12 hours; CHILD≥2 months: 0.5mg/kg SC every 12 hours; treatment of deep vein thrombosis and pulmonary embolism: 1.5mg/kg (150 units/kg) every 24 hrs usually for at least 5 days (and until oral anticoagulation established); CHILD<2 months, 1.5mg/kg SC every 12 hours;CHILD ≥2 months, 1mg/kg SC every 12 hours; treatment of unstable angina and non ST-segment- elevation myocardial infarction: 1mg/kg (100units/kg) every 12 hours usually for 2 to 8 days (minimum 2 days)  

Note dosing consideration required in severe renal impairment (CrCl<30ml/min)

**PHYTOMENADIONE (Vit K)**

Injection, 10mg/ml (1ml) NRH/RRH/DH/BHU  

Therapeutic group anticoagulant antagonists  

Indications correction of vitamin K deficiency in neonates and liver disease; reversal of hypoprothrombinemia due to anticoagulant therapy  

Cautions rapid IV injection can lead to fatal collapse; phytonmenadione takes 12 hours to reverse acenocoumarol, and the oral anticoagulant effect will be limited for up to 2 weeks  

Dose NEONATE, by IM injection, 1mg (equivalent to 0.1ml) immediately after delivery; ADULT, by IM injection, 10mg or by slow IV injection, 0.5-5mg, depending on clinical condition  

Note phytonmenadione does not neutralize Heparin; use protamine sulphate instead

**PROTAMINE SULPHATE**

Injection, 10mg/ml (5ml) NRH/RRH  

Therapeutic group: heparin antagonists  

Indications to counteract the anticoagulant effect of heparin  

Contraindications known hypersensitivity to the medicine or to fish (protamine is purified fish protein)  

Cautions if administered in the absence of heparin, protamine itself has an anticoagulant effect by binding with fibrinogen instead; use with caution in men who are infertile or who have had a vasectomy
Side effects  nausea, vomiting, lassitude, flushing, dyspnoea, bradycardia, hypotension; hypersensitivity reactions (including angioedema, anaphylaxis) reported.

Dose by IV injection, over approx. 10 minutes, 1mg neutralises 80-100 units heparin when given within 15 minutes of heparin; if longer time, less protamine required as heparin rapidly excreted; max. 50 mg; maximum rate of injection: 20mg/minute, i.e. 2ml/minute.

Note  protamine does not neutralize oral anticoagulants

WARFARIN

Tablet, 1mg, 3mg and 5mg NRH/RRH

Therapeutic group  anticoagulants

Indications prophylaxis of embolisation in rheumatic heart disease and atrial fibrillation; prophylaxis after insertion of prosthetic heart valve; prophylaxis and treatment of venous thrombosis and pulmonary embolism; transient ischemic attacks

Contraindications pregnancy, first trimester (use heparin, if essential); situations where prothrombin time cannot be monitored, peptic ulcer, severe hypertension, bacterial endocarditis

Cautions hepatic or renal disease, recent surgery

Interactions see appendix 1

Side effects haemorrhage, rash, alopecia, diarrhoea

Dose by oral administration, induction dose: 10mg daily for 2 days; subsequent daily maintenance dose is to be determined depending upon the prothrombin time; this is usually 3 to 9mg/day taken at the same time each day

Counseling do not start or stop any other medicines without checking with the doctor; do regular blood tests

Note warfarin usually takes 3-5 days to reach steady state; use heparin during this period; dose adjusted according to International Normalized Ratio (INR)

TRANEXAMIC ACID

Injection, 50mg/ml (5ml) NRH/RRH
Capsule, 250mg NRH

Therapeutic group  antifibrinolytic agent

Indications treatment and prophylaxis of haemorrhage associated with excessive fibrinolysis; to control bleeding during neurosurgical operations

Side effects nausea, vomiting, diarrhea; infrequently hypotension and thrombosis

Cautions dose reduction required in renal impairment; increases risk of thrombotic adverse effects

Contraindications active intravascular clotting

Dose by oral administration, 1-1.5g, 2 to 3 times daily; by IV injection, 10mg/kg

15. Blood products  and plasma substitute

HYDROXYETHYL STARCH
Injection, 3% (500ml)  
NRH/RRH

Therapeutic group: plasma substitutes

Indications: hypovolaemia

Cautions: cardiac disease; renal impairment

Side effects: hypersensitivity

Dose: by IV infusion, 500-1000ml

16. Cardiovascular medicines

16.1. Antianginal medicines

ISOSORBIDE DINITRATE

Tablet, 5mg (sublingual) and 10mg  
NRH/RRH/DH

Therapeutic group: antianginal (nitrates)

Indications: angina; occasionally for resistant congestive heart failure, left ventricular failure

Contraindications: known hypersensitivity, marked anaemia, closed angle glaucoma, head trauma, cerebral haemorrhage

Cautions: head injury, closed-angle glaucoma; hypotensive conditions; tolerance may develop; sudden withdrawal may precipitate cardiac ischemia

Interactions: see appendix 1 under nitrates

Side effects: throbbing headache, flushing, postural hypotension, and allergic phenomena

Dose: by sublingual administration, 5-10mg as required; by oral administration, 30-120mg daily in divided doses, up to 240mg per day in heart failure

Counseling: sublingual: place one or two tablets under your tongue and let it dissolve slowly

Note: regular prophylaxis with oral medication is effective if given regularly at adequate dosage, and is considerably cheaper; for mild or occasional chest pain, immediate sublingual treatment is preferred

NITROGLYCERINE

Injection, 5mg/ml (5ml)  
NRH/RRH/DH

Therapeutic group: antianginal (nitrates)

Indications: prophylaxis and treatment of angina

Contraindications: hypersensitivity to nitrates; hypotensive conditions and hypovolaemia; hypertrophic obstructive cardiomyopathy, aortic stenosis, cardiac tamponade, constrictive pericarditis, mitral stenosis, marked anaemia, head trauma, cerebral haemorrhage, closed angle glaucoma

Cautions: cerebrovascular disease, COPD, pregnancy, lactation

Interactions: see appendix 1 under nitrates

Side effects: headache (treat with mild analgesics if unbearable), reddening of skin, allergic contact dermatitis, faintness or light headedness, dizziness, postural hypotension associated with reflex induced tachycardia, nausea and vomiting

Dose: by IV infusion, 10-200 mcg/min

Note: the injection is to be used only after suitable dilution; usual initial dose in angina is 10 mcg/min, increasing gradually
**EPHEDRINE**

Injection, 30mg/ml (1ml)  
**Therapeutic group** antianginal (sympathomimetic)  
**Indications** reversible hypotension from spinal or epidural surgery  
**Caution** hyperthyroidism, diabetes mellitus, ischemic heart disease, hypertension, angle-closure glaucoma, elderly, pregnancy; may cause acute urine retention in prostatic hypertrophy  
**Contraindications** breastfeeding  
**Side effects** nausea, vomiting, anorexia; tachycardia, arrhythmias, angina pain, vasoconstriction with hypertension, vasodilation with hypotension, dizziness and flushing; dyspnoea; headache, anxiety, restlessness, confusion, psychoses, insomnia, tremor; difficulty in micturition, urine retention; sweating, hyper-salivation; changes in blood-glucose concentration  
**Dose** *by slow IV injection*, 3-6 mg repeated every 3-4 minutes according to response to max. 30 mg

**PHENYLEPHRINE**

Injection, 10mg/ml  
**Therapeutic group** sympathomimetic  
**Indications** mild to moderate hypotension and hypotensive shock  
**Contraindications** hypersensitivity to phenylephrine; severe hypertension; closed angle glaucoma  
**Caution** cerebrovascular insufficiency, hypertension, cardiovascular disorder; prostatic hypertrophy  
**Side effects** hypertension, anxiety, headache, rebound congestion; metabolic acidosis, decreased urine output  
**Dose** *mild to moderate hypertension*: *by IM injection*, initially, 2-5mg, then 1-10mg;  
**hypotensive shock**: *by IV injection*, in increments of 100-180mcg, then *by IV infusion*, 40-60mcg/min

**AMLODIPINE**

Tablet, 5mg  
**Therapeutic group** antihypertensive; antianginal (calcium-channel blocker)  
**Indications** hypertension, prophylaxis of angina  
**Contraindications** cardiogenic shock, unstable angina, significant aortic stenosis; pregnancy; breastfeeding  
**Cautions** hepatic impairment  
**Interactions** appendix 1 (calcium-channel blockers)  
**Side effects** abdominal pain, nausea; palpitations, flushing, oedema; headache, dizziness, sleep disturbances, fatigue; less commonly GI disturbances, dry mouth, taste disturbances, hypotension, syncope, chest pain, dyspnoea, rhinitis, mood changes, tremor, paraesthesia, urinary disturbances, impotence, gynaecomastia, weight changes, myalgia, visual disturbances, tinnitus, pruritus, rashes (including isolated reports of erythema multiforme), alopecia, purpura, and skin discolouration; very rarely gastritis, pancreatitis, hepatitis, jaundice, cholestasis, gingival hyperplasia, myocardial infarction, arrhythmias, vasculitis, coughing, hyperglycaemia, thrombocytopenia, angioedema, and urticaria
Dose by oral administration, initially 5mg once daily; max. 10mg once daily

VERAPAMIL

Tablet, 40mg \hspace{1cm} NRH/RRH

Therapeutic group antianginal; antiarrhythmic (calcium channel blockers)

Indications supraventricular arrhythmias; angina, hypertension

Contraindications hypotension, bradycardia, 2nd and 3rd degree heart block and sinoatrial block; cardiogenic shock and uncompensated heart failure; atrial flutter and fibrillation complicating the Wolff-Parkinson white syndrome

Cautions pregnancy, breastfeeding, children, hepatic impairment, patients taking beta-blockers

Interactions see appendix 1 under calcium channel blockers

Side effects constipation; less commonly, nausea, vomiting, flushing, headaches, dizziness, fatigue and ankle oedema

Dose by oral administration, supraventricular arrhythmias: 40-120 mg 3 times daily; angina: 80-120mg 3 times daily

ATENOLOL

Tablet, 50mg \hspace{1cm} NRH/RRH/DH/BHU

Therapeutic group antianginal; antiarrhythmic; anti hypertensive (beta-blocker)

Indications hypertension, angina, arrhythmias

Contraindications sinus bradycardia, heart block greater than 2nd degree, untreated cardiac failure, cardiogenic shock, asthma or history of obstructive airway disease

Cautions variant angina, acute MI, bronchospastic diseases, diabetes mellitus, peripheral vascular disorders, hepatic and renal dysfunction, elderly patients; reduce dose in renal impairment; pregnancy (may cause intra-uterine growth restriction, neonatal hypoglycaemia and bradycardia); breastfeeding (small amount in milk); avoid abrupt withdrawal especially in angina

Interactions see appendix 1 under beta-blockers

Side effects bradycardia, heart failure, hypotension, conduction disorders, bronchospasm, peripheral vasconstriction (including exacerbation of intermittent claudication and Raynaud's phenomenon), GI disturbances, fatigue, sleep disturbances

Dose by oral administration, 50mg once daily, increased to 100mg once daily; hypertension: 50 mg daily (higher doses rarely necessary); arrhythmias: 50–100 mg daily; angina: 100 mg daily in 1 or 2 doses

PROPRANOLOL

Tablet, 40mg \hspace{1cm} NRH/RRH

Therapeutic group antianginal, antiarrhythmic, antithyroid and antimigraine

Indications treatment of angina, arrhythmias, hyperthyroidism, and prophylaxis of migraine

For details, see under antimigraine medicines

Dose by oral administration, angina: 40mg 2-3 times daily, increasing to a maximum of 240mg daily; arrhythmias: 10-40mg 3-4 times daily; migraine prophylaxis: 40mg 2-3 times daily
METOPROLOL SUCCINATE

Tablet, 25mg  
NRH/RRH

Therapeutic group antianginal; antihypertensive(beta-blockers)

Indications arrhythmias following acute myocardial infarction

For details see under propranolol

Dose by oral administration, 50mg 2-3 times daily; up to 300mg daily in divided doses if necessary

16.2. Antiarrhythmic medicines

LIGNOCAINE

Injection, 2% (50ml) (preservative free)  
NRH/RRH

Therapeutic group antiarrhythmic and general anaesthetic

Indications ventricular arrhythmias, especially after myocardial infarction

Contraindications sino-atrial disorders, all grades of atrioventricular block, severe myocardial depression; porphyria

Cautions lower doses in congestive cardiac failure, in hepatic failure, and following cardiac surgery; elderly

Side effects dizziness, paraesthesia, or drowsiness (particularly if injection too rapid); other CNS effects include confusion, respiratory depression and convulsions; hypotension and bradycardia (may lead to cardiac arrest); hypersensitivity

Dose by IV administration, in patients without gross circulatory impairment, 100mg as a bolus over a few minutes (50 mg in lighter patients or those whose circulation is severely impaired), followed immediately by infusion of 4 mg/minute for 30 minutes, 2 mg/minute for 2 hours, then 1 mg/minute. The infusion should be stopped as soon as the patient’s cardiac rhythm appears to be stable or at the earliest signs of toxicity. Patients should be changed to oral anti-arrhythmic agents for maintenance therapy; note: ECG monitoring and specialist advice for infusion

AMIODARONE

Tablet, 200mg  
NRH/RRH

Therapeutic group antiarrhythmic

Indications life threatening ventricular arrhythmia, ventricular fibrillation, haemodynamically unstable ventricular tachycardia, sub-ventricular tachycardia, arrhythmias associated with accelerated conduction

Contraindications pregnancy (possible risk of neonatal goitre), breastfeeding (significant amount present in milk), sinus bradycardia, sinoatrial heart block, circulatory collapse, severe arterial hypotension, and congestive heart failure

Cautions heart failure, renal impairment, corneal deposits, elderly; liver, lung & thyroid function tests required in long term therapy; severe bradycardia & conduction disturbances in excessive dosage; porphyria

Interactions see appendix 1

Side effects reversible corneal micro deposits, rarely impaired vision, peripheral neuropathy & myopathy (reversible on withdrawal), bradycardia, phototoxicity, jaundice, hepatitis, cirrhosis, hypothyroidism, hyperthyroidism, pneumonitis

Dose by oral administration, life threatening ventricular arrhythmias, ventricular fibrillation, hemodynamically unstable ventricular tachycardia:
initially, 600-800mg/day in divided doses for 1 month, maintenance dose: 400mg/day; sub-ventricular tachycardia, arrhythmia associated with accelerated conduction: 1st week, 200mg 3 times daily; 2nd week, 200mg 2 times daily; maintenance: 200mg daily

Counseling avoid exposure of skin to direct sunlight

Note amiodarone contains a large amount of organic iodine (75mg iodine in each 200mg tablet) and has a very long half-life (27-107 days)

ADENOSINE

Injection, 6mg/ml (2ml) NRH/RRH/DH
Therapeutic category antiarrhythmic

Indications rapid reversion to sinus rhythm of paroxysmal supraventricular tachycardias, including those associated with accessory pathways (e.g. Wolff-parkinson-white syndrome)

Contraindications second or third degree AV block and sick sinus syndrome; asthma

Cautions atrial fibrillation or flutter with accessory pathways; heart transplant

Side effects transient facial flush, chest pain, dyspnoea, bronchospasm, choking sensation, nausea, light headedness, and severe bradycardia

Interactions see under appendix 1

Dose by rapid IV injection, PSVT, into central or large peripheral vein, ADULT, 3mg over 2 seconds with cardiac monitoring, if necessary followed by 6mg after 1-2 minutes and then by 12mg after a further 1-2 minutes; increments should not be given if high level AV block develops at any particular dose; CHILD<50kg 0.05-0.1mg/kg rapid IV over 1-3 seconds, no more than 0.3mg/kg/dose followed by rapid flush with > 5ml 0.9% sodium chloride

Note: 3mg dose ineffective in a number of patients, therefore higher initial dose may be necessary but for patients with heart transplant who are very sensitive to effects of adenosine should not receive higher initial dose

VERAPAMIL

Tablet, 40mg NRH/RRH
Therapeutic group antianginal; antiarrhythmic (calcium channel blockers)

Indications supraventricular arrhythmias; angina, hypertension

For details, see under antiangina medicines

Dose by oral administration, supraventricular arrhythmias: 40-120mg 3 times daily; angina: 80-120mg 3 times daily

DILTIAZEM

Injection, 5mg/ml (10ml) NRH
Therapeutic group calcium channel blocker

Indication prophylaxis and treatment of angina; paroxysmal supraventricular tachycardia and atrial fibrillation/flutter

Contraindications severe bradycardia, left ventricular failure with pulmonary congestion, second or third-degree AV block (unless pace maker fitted), sick sinus syndrome; pregnancy and breastfeeding
Cautions reduce dose in hepatic and renal failure; heart failure or significantly impaired left ventricular function, bradycardia (avoid if severe), first degree AV block or prolong PR interval

Interactions see appendix 1

Side effects bradycardia, sino aterial block, AV block, palpititation, comma, dizziness, hypotension, malaise, asthenia, headache, hot flushes, GI disturbances, edema (notably of ankles); rarely rashes (including erythema multiform and exfoliative dermatitis), photo sensitivity, hepatitis, gynaecomastia, gum hyperplasia, EPS, and depression

Dose paroxysmal supraventricular tachycardia and aterial fibrillation: by IV injection, 0.25mg/kg (average adult dose, 20mg) over 2 minutes; after 15 minutes, may repeat bolus by administering 0.35mg/kg actual body weight over 2 minutes (average adult dose, 25mg)

Note use weight based dosing for lower body weight patients

**DIGOXIN**

Injection, 250mcg/ml (2ml) NRH/RRH Tablet, 250mcg NRH/RRH/DH/BHU

Therapeutic group antiarrhythmic; medicines used in heart failure (cardiac glycosides)

Indications congestive cardiac failure, tachycardia of supraventricular origin

Contraindications AV block, intermittent complete heart block, second degree AV block; supraventricular arrhythmias caused by Wolff-Parkinson-White syndrome; ventricular tachycardia or fibrillation; hypertrophic obstructive cardiomyopathy (unless concomitant atrial fibrillation and heart failure -but with caution)

Cautions myocardial ischemia, hypoxia, hypokalaemia, and IV administration; loading dose can sometimes precipitate toxicity; use with caution in pulse rate below 60 beats/min

Interactions see appendix 1 under cardiac glycosides

Side effects and over dosage dose-dependent effects, occurring in a small proportion of patients, may include nausea and vomiting, induced dysrhythmias and heart block; mild toxicity can be treated by interrupting treatment for 1-2 days; more serious toxicity may demand a slow IV infusion of potassium chloride or IV lignocaine; accidental overdose in children is characterized by vomiting, drowsiness, bradycardia and accentuated sinus arrhythmia; digoxin side effects can be monitored using ECG

Dose ADULT, 0.25mg twice daily for 1-3 weeks then reduce according to response; loading dose (seldom required): 0.75-1.5mg stat, followed by 0.25mg 6 hourly until clinical response or toxic effects are seen; CHILD under 10 years require relatively high doses, initially 0.01-0.02mg/Kg by any route, repeated 6 hourly according to response; maintenance: 0.01-0.02mg Kga daily or as required

Note the earliest evidence of Digoxin toxicity is often loss of appetite; it is a good practice always to ask patients if they are taking food as normal

**ISOPRENALINE**

Injection, 2mg/ml (1ml) NRH

Therapeutic group antiarrhythmic

Indications cardiogenic and septicaemic shock; heart block and bradycardia
Cautions: the risk of inducing serious cardiac dysrhythmia is increased in patients with ischemic heart disease, hypothyroidism or hypoxia.

Side effects and over dosage: palpitation, tachycardia, headache and flushing; severe dysrhythmias are uncommon at therapeutic dosage, but in over dosage, sudden death may occur due to ventricular fibrillation.

Dose by IV infusion: 0.5-10 mcg/min according to response.

**ADRENALINE**

Injection, 1mg/ml (1ml) (1:1000) NRH/RRH/DH/BHU

Therapeutic group: antiallergics (vasoconstrictor sympathomimetic) and medicines used in emergency treatment of acute anaphylaxis; antiarrhythmic.

Indications: emergency treatment of acute anaphylaxis; angioedema; cardiopulmonary resuscitation.

For details: see adrenaline under section 3.

Dose cardiac arrest: by IV injection, 1mg repeated at 3 minute intervals, if necessary.

Note: IV route is for cardiac resuscitation only. Cardiac arrest: 1mg intra-cardiac injection in extremis; then IV as for anaphylaxis (for IV injection, dilute 1:10 in Water for Injections); IV route should be used with extreme care.

**PROPRANOLOL**

Tablet, 40mg NRH/RRH

Therapeutic group: antimigraine; antiarrhythmic; antiangina; antithyroid.

Indications: prophylaxis of migraine, treatment of angina, arrhythmias, and hyperthyroidism.

For details, see under antimigraine medicines.

Dose by oral administration, angina: 40mg 2-3 times, daily, increasing to a maximum of 240mg daily; arrhythmias: 10-40mg 3-4 times daily.

Counseling: do not stop taking this medicine except on doctor’s advice.

16.3. Antihypertensive medicines

**HYDROCHLOROTHIAZIDE**

Tablet, 25mg NRH/RRH/DH/BHU

Therapeutic group: antihypertensive; medicines used in heart failure (thiazide diuretics).

Indications: hypertension acute and chronic heart failure, hepatic and renal oedema.

Contraindications: renal failure advanced hepatic failure, hyponatraemia.

Cautions: may cause potassium depletion and aggravate renal impairment, especially in the young, the old, and during substantial diuresis; use in pregnancy only if benefit outweighs risk of jaundice and thrombocytopenia in baby; if required during lactation, breastfeeding should be suspended.

Interactions: see appendix 1 under diuretics.

Side effects: GI disturbances; water and electrolyte disturbances, aggravation of diabetes, exacerbation of gout, may all be seen.
Dose by oral administration, oedema: 50-75mg daily at first, reducing to 25-50mg daily on alternate days; hypertension: initiate with 12.5mg and increasing to 50mg daily if required

Counseling take this medicine in the morning regularly as instructed

Note hydrochlorothiazide is the first-line medicine in all cases of hypertension, except hypertensive crisis. In adequate dose, it will control many cases of hypertension without having to resort to more complex medicines

FUROSEMIDE

Injection, 10mg/ml (2ml)  NRH/RRH/DH
Tablet, 40mg  NRH/RRH/DH

Therapeutic group antihypertensive (loop diuretics); acute heart failure medicine

Indications treatment of systemic or pulmonary oedema of cardiac, hepatic or renal origin when either a prompt and vigorous diuresis is required or the response to hydrochlorothiazide has been inadequate

Contraindications hyponatraemia and hypokalaemia; hepatic failure; precomatose states associated with liver cirrhosis; liver failure with anuria

Cautions regular monitoring of fluid and electrolyte balance is essential, especially in the young and the elderly; massive diuresis may result in circulatory collapse; hypokalaemia and metabolic acidosis are common; pregnancy and breastfeeding, hypotension; correct hypovolaemia before using in oliguria; liver failure, prostatic enlargement; porphyria

Interactions see appendix 1under diuretics

Side effects water and electrolyte imbalance; acute urinary retention in patients with prostatic hypertrophy; unmasking of latent diabetes

Dose oedema associated with heart failure, liver cirrhosis and nephritic syndrome: by oral administration, ADULT, 40-80mg once daily, adjusting within the range 20-100mg daily according to response, in divided doses if necessary; CHILD, 1-3mg/kg daily; by IM injection, 0.5-1.5mg/Kg; By IV or IM injection, 20-40mg once daily; can be increased by 20mg every 2 hours; resistant hypertension: by oral administration, 20-80mg 1 to 2 times daily

Counseling take this medicine regularly in the morning; add KCI syrup on prolonged treatment

SPIRONOLACTONE

Tablet, 25mg  NRH/RRH/DH

Therapeutic group antihypertensive; medicines used in heart failure (potassium sparing diuretics)

Indications: oedema and ascites in cirrhosis; malignant ascites; nephrotic syndrome; congestive heart failure; hypertension

Contraindications hyperkalaemia, hyponatraemia, pregnancy and breastfeeding

Cautions elderly patients; hepatic and renal impairment

Interactions see appendix 1under diuretics

Side effects GI disturbances, gynaecomastia, hyperkalaemia, lethargy, headache, confusion
Dose by oral administration, hypertension: ADULT, 25-100 mg daily, adjusted according to response; oedematous conditions: ADULT, 25-200mg daily increased to 400mg if required; CHILD, 3mg/kg daily in divided doses

METHYLDOPA

Tablet, 250mg

Therapeutic group antihypertensive

Indications treatment of hypertension in pregnancy, heart failure and asthma where other medicines are contraindicated

Contraindications history of depression, active liver disease, pheochromocytoma

Cautions positive direct Coombs’ test in 20% of patients may affect cross matching, so inform Pathologist of the medication; other laboratory tests may also be affected; reduce dose in renal impairment

Interactions see appendix 1

Side effects GI disturbances, dry mouth, sedation, depression, diarrhoea, fluid retention, ejaculatory failure, and liver damage are all minimized if the total daily dose is below 1 gram; side effects are dose dependent and occurs with higher doses

Dose by oral administration, 250mg 2-3 times daily, gradually increased at an interval of 2 or more days if required, maximum daily dose of 3g; ELDERLY, 125mg twice daily gradually increased if required; maximum daily dose of 2g daily

Counseling may cause drowsiness; if affected, do not drive or operate machinery; do not stop taking this medicine except on doctor’s advice

HYDRALAZINE

Injection, 20mg/1ml

Tablet, 25mg

Therapeutic group antihypertensive

Indications hypertension, when uncontrolled by other medicines; hypertensive crisis including eclampsia, heart failure (with long acting nitrates)

Contraindications severe tachycardia, high-output heart failure, myocardial Insufficiency due to mechanical obstruction, cor pulmonale, dissecting aortic aneurysm

Cautions reduce initial dose in renal impairment, coronary artery disease and recent myocardial infarction; parenteral therapy sometimes results in sudden fall of blood pressure

Interactions see appendix 1

Side effects tachycardia, palpitations, flushing, hypotension, fluid retention, GI disturbances; headache, dizziness; systemic lupus erythematosus-like syndrome after long-term therapy with over 100 mg daily

Dose by oral administration, 25mg twice daily, increasing to a maximum of 50mg twice daily if required; heart failure (initiated in hospital): 25 mg 3-4 times daily, increased every 2 days if necessary, usual maintenance dose 50-75 mg 4 times daily; by slow IV injection, 5-10mg diluted with 10ml sodium chloride 0.9% over 20 minutes; repeat after 30 minutes if required; by IV infusion: 0.2-0.3mg/minute at first, then 0.05-0.15m/ minute

NIFEDIPINE
Tablet (Sustained Release), 20mg  NRH/RRH/DH

**Therapeutic group**: antihypertensive (calcium channel blockers)

**Indications**: hypertension

**Contraindications**: cardiogenic shock

**Cautions**: pregnancy-labour may be inhibited; withdraw, if ischemic pain occurs or worsens soon after treatment starts; reduce dose in hepatic impairment

**Interactions**: see appendix 1 under calcium channel blockers

**Side effects**: headache, flushing, dizziness, lethargy; occasional gravitational oedema, rash, nausea, eye pain and frequency of micturition

**Dose**: **hypertension**: by oral administration, 20mg twice daily, increased up to max of 40 mg twice daily

**Counseling**: SR tablets should not be broken; swallow whole

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**AMLODIPINE**

Tablet, 5mg  NRH/RRH/DH

**Therapeutic group**: antihypertensive; antiangina medicines (calcium channel blocker)

**Indications**: hypertension, prophylaxis of angina

*For details, see under antiangina medicines*

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**ATENOLOL**

Tablet, 50mg  NRH/RRH/DH

**Therapeutic group**: antianginal; antiarrhythmic; antihypertensive (beta-blockers)

*For details refer atenolol under antianginal medicines*

**Dose by oral administration, hypertension**: 25-50mg daily (higher doses not considered necessary); arrhythmias: 50-100mg daily; angina: 100mg daily in 1 or 2 divided doses

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**ENALAPRIL**

Tablet, 5mg  NRH/RRH/DH

**Therapeutic group**: antihypertensive; medicines used in heart failure (ACE inhibitors)

**Indications**: hypertension; symptomatic heart failure; prevention of symptomatic heart failure in patients with left ventricular dysfunction

**Contraindications**: hypersensitivity to ACE inhibitors (including angioedema) and in known or suspected renal artery stenosis; pregnancy

**Cautions**: ACE inhibitors need to be initiated with care in patients receiving diuretics; first doses may cause hypotension especially in patients taking high doses of diuretics, on a low-sodium diet, on dialysis, dehydrated or with heart failure. They should also be used with caution in peripheral vascular disease or generalised atherosclerosis owing to risk of clinically silent renovascular disease. Renal function should be monitored before and during treatment, and the dose reduced in renal impairment.

**Interactions**: see appendix 1 under ACE inhibitors

**Side effects**: see cautions above; also dry cough, palpitations, arrhythmias, angina, chest pain, Raynaud's syndrome, syncope, cerebrovascular accident, myocardial infarction; anorexia, ileus, stomatitis, hepatic failure; dermatological
side effects including erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis and pemphigus; confusion, depression, nervousness, asthenia, drowsiness, insomnia, dream abnormalities, blurred vision, tinnitus, sweating, flushing, impotence, alopecia, dyspnoea, asthma, pulmonary infiltrates and muscle cramps

**Dose by oral administration, hypertension:** used alone, initially 5 mg once daily; if used in addition to diuretic, or in renal impairment, initially 2.5 mg daily; usual maintenance dose 20 mg once daily; max. 40 mg once daily

**Counseling** profound first dose hypotension may occur when ACE inhibitors are introduced in patients with severe heart failure or those receiving high doses of diuretics, high dose vasodilatory therapy, hypovolemic, impaired renal, aged 70 years or more. Therefore, ACE inhibitors should be initiated under specialist supervision and with clinical monitoring in the above mentioned patients.

**LOSARTAN**

Tablet, 25mg

**Therapeutic group** antihypertensive (angiotensin II antagonists)

**Indications** hypertension; diabetic nephropathy in type 2 diabetes mellitus and in patients where enalapril is not tolerated due to cough

**Contraindications** hypersensitivity; pregnancy and lactation

**Cautions** absolute contraindication in renal artery stenosis; monitoring of plasma potassium is advised in elderly & in patients with renal impairment

**Interactions** see appendix 1 under angiotensin II antagonists

**Side effects** diarrhoea, dizziness, taste disturbance; usually mild, symptomatic hypotension may occur, particularly in patients with intravascular volume depletion

**Dose by oral administration,** 50mg once daily, increased to 100mg daily in 2 divided doses; ELDERLY and over 75 years with mild to moderate severe renal impairment, 25mg once daily

**Counseling** do not stop taking this medicine except on your doctor’s advice; dizziness or light-headedness may occur after the first dose of this medicine; do not drive or operate machinery

**CLONIDINE**

Injection, 150µg/ml

**Therapeutic group** alpha 2-agonist (centrally acting)

**Indications** hypertension, migraine, menopausal flushing

**Cautions** must be withdrawn gradually to avoid hypertensive crises; Raynaud’s syndrome or other peripheral vascular disease

**Interactions** see appendix 1

**Side effects** dry mouth, sedation, depression, fluid retention, bradycardia, headache, dizziness, euphoria, nocturnal unrest, rash, nausea, constipation

**Dose by IV infusion,** 150-300mcg; max. 750mcg in 24 hours

16.4 Medicines used in heart failure

**ENALAPRIL**

Tablet, 5mg
Therapeutic group medicines used in heart failure; antihypertensive (ACE inhibitors)

For details refer enalapril under antihypertensives

Dose congestive heart failure, asymptomatic left ventricular dysfunction: by oral administration, initially, 2.5 mg daily under close medical supervision; usual maintenance dose 20mg daily in 1-2 divided doses; max. 40mg daily

DIGOXIN

Injection, 250mcg/ml (2ml) NRH/RRH
Tablet, 250mcg NRH/RRH/DH/BHU

Therapeutic group antiarrhythmic; medicines used in heart failure (cardiac glycosides)

Indications congestive cardiac failure, tachycardia of supraventricular origin

For details, refer digoxin under antihypertensives

Dose by oral administration, ADULT, 0.25mg twice daily for 1-3 weeks then reduced according to response; loading dose (seldom required): 0.75-1.5mg stat, followed by 0.25mg 6-hourly until clinical response or toxic effects are seen; CHILD under 10 requires relatively high doses, initially, 0.01-0.02mg/Kg by any route, repeated 6 hourly according to response; maintenance: 0.01-0.02mg/kg daily or as required

SPIRONOLACTONE

Tablet, 25mg NRH/RRH/DH

Therapeutic group antihypertensive; medicines used in heart failure (potassium sparing diuretics)

For details, refer spironolactone under antihypertensive

Dose by oral administration, ADULT, 100-200mg daily; CHILD, 3mg/kg daily in divided doses

HYDROCHLOROTHIAZIDE

Tablet, 25mg NRH/RRH/DH/BHU

Therapeutic group antihypertensive; medicines used in heart failure (thiazide diuretics)

Indications acute and chronic heart failure, hepatic and renal oedema, hypertension

For details, refer hydrochlorothiazide under antihypertensive

Dose by oral administration, oedema: 50-75mg daily at first, reducing to 25-50mg daily on alternate days

DOPAMINE

Injection, 200mg/5ml NRH/RRH/DH

Therapeutic group medicines used in heart failure (sympathomimetic)

Indications cardiogenic shock in infarction or cardiac surgery

For details, refer dopamine under sympathomimetic

Dose dilute 4 ampoules (800mg) with 500ml dextrose or saline solution (not bicarbonate); solution now contains 1.6mg/ml, or 1600 micrograms/ml; by IV infusion into a large vein, 2-5 mcg/min may be successful, but may cause renal vasoconstriction, so urine output must be checked frequently
CARVEDIOL
Tablet, 3.125mg NRH/RRH

**Therapeutic group** medicines used in heart failure (beta-blockers)

**Indications** adjunct to diuretics, digoxin, or ACE inhibitors in symptomatic chronic heart failure

**Cautions** see under propranolol; before increasing dose ensure renal function and heart failure not deteriorating; severe heart failure, avoid in acute or decompensated heart failure requiring IV inotropes

**Contraindications** see under propranolol; severe chronic heart failure; hepatic impairment

**Side effects** postural hypotension, dizziness, headache, fatigue, GI disturbances, bradycardia; occasionally diminished peripheral circulation, peripheral oedema and painful extremities, dry mouth, dry eyes, eye irritation or disturbed vision, impotence, disturbances of micturition, influenza like symptoms; allergic skin reactions, nasal stuffiness, wheezing, depressed mood, sleep disturbances, heart failure, changes in liver enzymes, thrombocytopenia, leucopenia

**Dose by oral administration**, initially 3.125 mg twice daily, dose increased at intervals 2 weeks, up to highest dose tolerated, max 25mg twice daily in patients with severe heart failure or body weight less than 85 kg and 50mg twice daily in patients over 85kg

**Note** beta-blocker therapy in patients with heart failure can be extremely difficult to manage; the initiation and up-titration should be undertaken in consultation with a specialist

16.5 Antiplatelet agents

ASPIRIN
Tablet (Enteric coated), 75mg NRH/RRH/DH/BHU

**Therapeutic group** antiplatelet medicines

**Indications** prophylaxis of cerebrovascular disease or myocardial infarction; It is also given following coronary bypass surgery

*For details, see aspirin under analgesics*

**Dose by oral administration**, as single dose of 150-300mg as soon as possible after an ischemic event, followed by maintenance treatment with 75-150mg daily

CLOPIDOGREL
Tablet, 75mg NRH/RRH

**Therapeutic group** antiplatelet agent

**Indications** prevention of atherosclerotic events in peripheral arterial disease; myocardial infarction and ischemic stroke

**Contraindications** active bleeding, breastfeeding

**Cautions** patients at risk of increased bleeding from trauma, surgery or other pathological conditions; concomitant use of medicines that increase risk of bleeding; discontinue 7 days before elective surgery if platelet effect not desirable; hepatic and renal impairment; pregnancy

**Interactions** see appendix 1 under antiplatelets

**Side effects** dyspepsia, abdominal pain, diarrhoea; bleeding disorders (including GI and intracranial); less commonly nausea, vomiting, gastritis, flatulence,
constipation, gastric and duodenal ulcers; headache, dizziness, paraesthesia, leucopenia, decreased platelets, eosinophilia, rash, and pruritus; rarely vertigo; and very rarely hypersensitivity like reactions

Dose by oral administration, prevention of atherosclerotic events in peripheral arterial disease or after myocardial infarction or ischemic stroke: 75mg once daily; acute coronary syndrome: initially, 300mg then 75mg daily; management of acute coronary syndromes, including unstable angina and non-Q wave myocardial infarction: initially, 300mg single dose, then 75 mg once daily

16.6. Lipid regulating medicines

ATORVASTATIN

Tablet, 10mg NRH/RRH/DH

Therapeutic group lipid regulating agent (statins)

Indications adjunct to diet in the treatment of mixed hyperlipidaemia

Contraindications active liver disease; pregnancy (adequate contraception required during treatment and for 1 month afterwards; breastfeeding)

Cautions history of liver disease, high alcohol intake use should be avoided in active liver disease); LFT to be carried out before and within 1-3 months of starting treatment and thereafter at intervals of 6 months for 1 year

Side effects headache, altered LFT, myalgia, myositis and myopathy have been reported with the statins; if myopathy is suspected and serum creatinine kinase is markedly elevated (more than 5 times upper limit) treatment should be discontinued

Dose by oral administration, primary hypercholesterolemia and mixed hyperlipidaemia: usually 10mg daily, up to a max of 80mg daily

Counseling advise patient to report promptly unexplained muscle pain, tenderness, and weakness

FENOFIBRATE

Tablet, 200mg NRH/RRH

Therapeutic group lipid regulating agent

Indications hyperlipidaemias of types IIa, IIb, III, IV, and V; in patients who have not responded adequately to diet modifications and other appropriate measures

Contraindications gall bladder disease; severe hepatic impairment; pregnancy and breastfeeding

Cautions hepatic impairment (liver function tests recommended every 3 months for first year and discontinue treatment if significantly raised) and renal impairment (avoid if creatinine clearance is <10ml/minute)

Interaction see appendix 1

Side effects GI disturbances, anorexia; less commonly cholestasis, weight gain, dizziness, headache, fatigue, drowsiness, renal impairment, raised serum creatinine (unrelated to renal impairment), erectile dysfunction, urticaria, pruritus, photosensitivity reactions

Dose by oral administration, ADULT, 200 mg daily with food initially; doses may be adjusted according to response to between 200 and 400 mg daily in divided doses; CHILD, 5 mg/kg daily.
Note fibrates are a first line therapy only in those whose serum triglyceride concentration is >180mg/dl or in those who cannot tolerate statins

16.7. Peripheral vasodilator

**PENTOXIFYLLINE**

Tablet, 400mg

**Therapeutic group** peripheral vasodilator

**Indications** peripheral vascular disease, tropic leg ulcers, cerebrovascular disease, retinal vascular disorders, diabetic vascular disorders, ischemic heart disease

**Contraindications** cerebral haemorrhage, extensive retinal haemorrhage, acute myocardial infarction, lactation, porphyria

**Interactions** see appendix 1

**Side effects** GI disturbances, dizziness, headache; rarely flushing, tachycardia; hypersensitivity including rash, pruritus and bronchospasm

**Dose** 400mg 2-3 times daily with meals, minimum 8 weeks for optimum effects

**Counseling** take this medicine with meals so that it will not upset your stomach

17. Medicines acting on the respiratory tract

17.1 Bronchodilators and inhaled corticosteroids

**THEOPHYLLINE + ETOPHYLLINE**

Injection, (25.3mg + 84.7mg)/ml (2ml) NRH/RRH/DH

Tablet, (69mg + 231mg) (retard) NRH/RRH/DH

**Therapeutic group** antiasthmatic (methylxanthine)

**Indications** prophylaxis and relief of reversible bronchospasm associated with asthma (acute & chronic), bronchitis including chronic bronchitis, emphysema, other obstructive airway diseases where there is a reversible airway narrowing

**Contraindications** hypersensitivity; neonates and lactation

**Cautions** in patients with severe cardiac disease, hypertension, hyperthyroidism, acute myocardial injury, CCF, history of peptic ulcer, children, pulmonary oedema, hepatic dysfunction, pregnancy and smokers

**Interactions** see appendix 1 under theophylline

**Side effects** cardiac arrhythmias in pre-existing cardiac disease, tachycardia anorexia, nausea, tremors, CNS excitation, hyperglycaemia

**Dose by oral administration**, 1 tablet 1 to 2 times daily; by IM or IV injection, ADULT, 2-4ml up to 2 or 3 times daily; also as a combined injection with dextrose; CHILD, 5mg/kg/dose slow IV, with close monitoring

**CAFFIENE CITRATE**

Injection, 20mg/ml (1ml) NRH/RRH

**Therapeutic group** respiratory stimulant

**Indications** neonatal apnea

**Contraindications** hypersensitivity

**Cautions** anxiety, agitation, tremor; seizure disorder; hepatic and renal impairment
Interactions see appendix 1

Side effects tachycardia, palpitations, insomnia, irritability, nervousness, restlessness, tremor, tinnitus, nausea, vomiting, diarrhoea, diuresis

Dose by IV administration, loading dose, 10-20mg/kg; maintenance dose, 5 to 10mg/kg/day

SALBUTAMOL

Inhalation, 100mcg/MDI (200MDIs) NRH/RRH/DH
Respiratory solution, 5mg/ml (15ml) NRH/RRH/DH/BHU
Tablet, 4mg NRH/RRH/DH/BHU

Therapeutic group bronchodilator

Indications asthma; bronchospasm in patients with reversible obstructive airway

Contraindications hypersensitivity and thyrotoxicosis

Cautions hyperthyroidism, myocardial insufficiency, arrhythmias, hypertension, elderly patients, diabetics

Side effects fine tremor, nervous tension, headache, peripheral vasodilatation, tachycardia, sleep and behavioural disturbance in children

Dose by oral administration, ADULT, 2-4mg 3-4 times daily; CHILD 2-5 years, 1-2mg 3-4 times daily; CHILD 6-12years, 2mg 3-4 times daily; by nebulisation (respiratory solution): for intermittent administration: ADULT, 0.5-1ml of respiratory solution diluted to a final volume of 2-4 ml with 0.9% sodium chloride is inhaled from a suitably driven nebuliser until aerosol generation ceases; CHILD under 12 years, 0.03ml/kg of solution diluted to 2-4 ml with 0.9% sodium chloride and inhaled from a nebuliser; for continuous administration: 1-2ml of the respiratory solution is diluted to 100ml with 0.9% sodium chloride to contain 50-100mcg salbutamol per ml. The diluted solution is administered as on aerosol by a suitably driven nebuliser. The usual rate of administration is 1-2mg per hour; by inhalation, management of chronic asthma: 2 MDIs (puff) up to 4 times daily; CHILD, 1 MDI, increased 2 MDIs if necessary, up to 4 times daily; prophylaxis of allergen or exercise induced bronchospasm: 2 MDIs as and when required

ADRENALINE

Injection, 1mg/ml (1ml) NRH/RRH/DH/BHU

Therapeutic group medicines used in allergy and anaphylaxis; antiasthmatic

Indications anaphylactic shock, asthma and cardiac arrest, severe angioedema; bronchiolitis in nebuliser ( paediatric)

For details, see adrenaline under section 3

Dose 0.1-0.5mg, by IM injection at 15-20 minute intervals as required; CHILD, 0.01mg/Kg, by SC injection, repeated after 4 hours if required

BECLOMETHASONE DIPROPIONATE

Inhalation ( aerosol), 50mcg/MDI (200MDIs) NRH/RRH

Therapeutic group antiasthmatic (steroid)

Indications chronic asthma not controlled by short acting β₂ agonists

Cautions systemic therapy may be required during periods of stress or when either airway obstruction or mucus prevents medicine access to smaller airways

Interactions its hypoglycaemic action may be potentiated by alcohol, fluconazole, beta-blockers, and possibly ACE inhibitors
Side effects  
Inhaled corticosteroids have considerably fewer systemic effects than oral corticosteroids; high doses of inhaled corticosteroids used for prolonged periods have been associated with oropharyngeal candidiasis cough and lower respiratory tract infection including pneumonia; adrenal suppression, growth retardation in children and adolescents, impaired bone metabolism, glaucoma and cataract.

Dose by inhalation, ADULT, 2 MDIs 2-3 times daily and in severe cases up to 4 times; CHILD, 1 MDI 2-3 times daily.

Counseling  rinse the mouth with water after inhalation to reduce the risk of oral candidiasis or use a spacer device if available.

**FLUTICASONE + SALMETEROL**

Inhalation, (250μg + 50μg) (200 actuations)  
NRH/RRH

Therapeutic group  antiasthmatic

Indications  prophylaxis of asthma and management of chronic obstructive pulmonary disease

Contraindications  hypersensitivity to fluticasone, salmeterol or any ingredients in the formulation

Cautions  arrhythmia, susceptibility to QT prolongation and diabetes; excessive dose of inhaled corticosteroids should be avoided in children

Side effects  fine tremor, headache, muscle cramp, palpitation, tachycardia, arrhythmia, myocardial ischemia and disturbances of sleep behavior; inhaled corticosteroids used in high doses and for prolonged period of time can cause adrenal suppression and reduction in bone mineral density; in older patients with COPD, higher doses of inhaled corticosteroid are associated with increased risk of lower respiratory tract infection including pneumonia; oral candidiasis

Dose by inhalation, ADULT and CHILD over 5 years, initially 1 MDI twice daily, increased up to 2 to 3 MDIs twice daily in severe cases.

Counseling  do not to use the preparation for relief of acute attack; rinse the mouth with water after inhalation to reduce the risk of oral candidiasis or use a spacer device if available.

**IPRATROPIUM**

Respiratory solution, 0.25mg/ml  
NRH/RRH/DH

Therapeutic group  antiasthmatic

Indications  chronic asthma, chronic obstructive pulmonary disease

Contraindications  hypersensitivity to ipratropium or any ingredients in the formulation

Cautions  prostatic hypertrophy; pregnancy; glaucoma (in case of nebulized medicine in association with salbutamol); risk of paradoxical bronchospasm

Side effects  occasionally dry mouth; rarely urinary retention and constipation; tachycardia and atrial fibrillation

Dose by inhalation of nebulized solution, chronic obstructive pulmonary disease: ADULT, 250-500 mcg 3-4 times daily; adjunct in acute bronchospasm: ADULT, 500 mcg repeated as required; CHILD up to 6 years: 125-250 mcg, maximum 1mg daily; CHILD 6-12 years, 250 mcg, maximum 1mg daily.
Counseling: advise patient to avoid spraying in or around eyes; advise patient that medicine may cause dizziness and to use caution while driving or performing other tasks requiring mental alertness.

17.2 Antitussives and decongestants

17.2.1 Antitussives

**CODEINE PHOSPHATE**

Tablet, 15mg

Therapeutic group: opioid analgesic; antitussive

For details, see codeine phosphate under section 3

Dose by oral administration, ADULT, 15-30mg 2 times; CHILD 2-5 years, 3mg two to three times daily; CHILD 6-12 years, 7.5-30mg 2 to 3 times daily.

17.2.2 Decongestants

**COMPOUND BENZOIN**

Tincture for inhalation (450ml)

Therapeutic group: antitussive and decongestants

Indications: nasal obstruction; viral respiratory conditions; adjunct in bacterial respiratory conditions

Cautions: the inhalation should not be made with boiling water, to avoid the risk of scalding; children and elderly should be supervised.

Dose: 5ml in 500ml hot water for inhalation

Counseling: this inhalation will help clear your breathing; in children, care must be taken to prevent burning.

18. Gastrointestinal Medicines

18.1 Medicines for dyspepsia and ulcer

18.1.1 Antacids

**ANTACID (Aluminum & Magnesium salts)**

Syrup (extemporaneous preparation)

Tablet, 650mg (flavored)

Therapeutic group: antacids

Indications: peptic ulcer syndrome, dyspepsia, reflux oesophagitis

Contraindications: hypophosphatemia

Cautions: renal impairment

Interactions: see appendix 1

Side effects: aluminium salts tend to be constipating while magnesium ones tend to be laxative; these may counterbalance, or either effect may be seen

Dose by oral administration, as tablet: 1-2 tablets chewed 3 times daily and at bedtime; as syrup: 10ml 3-4 times daily and at bed time; more frequent doses may be required in acute pain.

Counseling: antacids should preferably not be taken at the same time as other medicines since they may impair absorption.

**SODIUM CITRATE**

Powder for oral solution, 0.3 Molar

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Therapeutic group antacids, antiulcer medicines and acid aspiration prophylaxis

Indications to be given prior to caesarean-section and to prevent acid aspiration syndrome

Cautions elderly and debilitated, and also in patients with respiratory and metabolic alkalosis, hypocalcaemia and hypochlorhydria; renal impairment, heart failure, hypertension and eclampsia

Contraindications acute gastrointestinal conditions

Dose by oral administration, 15ml stat before the procedure

18.1.2. H₂ receptor antagonists

RANITIDINE

Injection, 25mg/ml (2ml) NRH/RRH/DH
Tablet, 150mg NRH/RRH/DH/BHU

Therapeutic group antiulcer (H₂ receptor antagonists)

Indications peptic ulcer unresponsive to antacids; reflux oesophagitis; prophylaxis of acid aspiration in surgical procedures

Contraindications hypersensitivity and children below 2 years

Cautions renal and hepatic impairment (reduce dose); in older patients where gastric carcinoma may be the underlying cause of peptic pain, this diagnosis must be excluded by radiography or endoscopy before ranitidine is used, or it may delay the diagnosis

Side effects altered bowel habits, rash, tiredness; reversible confusion states, reversible liver damage, headache

Dose reflux oesophagitis: by oral administration, ADULT, 150mg twice daily or 300mg at night for up to 8 weeks or if necessary 12 weeks; benign gastric & duodenal ulceration: by oral administration, ADULT, 150mg twice daily or 300mg at night for 4-8 weeks, then 150mg at night as required; By IM injection, ADULT, 50mg 6-8 every hour: by slow IV injection, ADULT, 50mg given over 2 minutes repeated every 6-8 hours; surgical procedures: by oral administration, ADULT, 150mg 2 hours before induction of anaesthesia; by IM or slow IV injection, ADULT, 1 hour before induction of anaesthesia

Counseling smoking and drinking alcohol should be reduced or stopped, as they can both cause the ulcer to get worse

18.1.3 Proton Pump Inhibitors

OMEPRAZOLE

Capsule, 20mg NRH/RRH/DH

Therapeutic group antacids and other antiulcer (proton pump inhibitors)

Indication peptic ulcer disease; combined with antibacterial for H. pylori induced gastritis; gastric oesophageal reflux disease; prevention and treatment of NSAIDs-associated ulcer

Contraindications children, neonate

Cautions liver disease; pregnancy; breastfeeding

Side effects GI disturbance (diarrhoea, nausea, vomiting); headache; hypersensitivity

Interactions see appendix 1 under proton pump inhibitors
Dose by oral administration, peptic ulcer: 20mg daily; GORD: 20mg daily; NSAIDs associated ulcer: 20mg daily for 4 weeks; H. pylori induced gastritis: 20mg 2 times in combination with antibacterials
Counseling it should be taken before food

18.1.4. Antiemetic

METOCLOPRAMIDE

Injection, 10mg/ml (2ml) NRH/RRH/DH/BHU
Tablet, 10mg NRH/RRH/DH/BHU

Therapeutic group antiemetics

Indications nausea and vomiting; adjunct treatment of reflux esophagitis; adjunct treatment of migraine and acid aspiration prophylaxis

Contraindications within 3-4 days of GI surgery, GI obstruction, perforation or haemorrhage

Cautions hepatic and renal impairment; the elderly, young adults and children

Interactions see appendix 1

Side effects extrapyramidal effects, especially in young adults and children; cardiac conduction abnormalities after IV administration

Dose by oral administration or by IM or slow IV injection (over at least 3 minutes), ADULT over 18 years, body weight over 60 kg, 10mg up to 3 times daily; body weight under 60 kg, max. daily dose 500 mcg/kg in 3 divided doses; CHILD 1-18 years, 100-150 mcg/kg up to 3 times daily
Counseling take before food

ONDANSETRON

Injection, 2mg/ml (4ml) NRH/RRH
Tablet, 4mg NRH/RRH

Therapeutic group antiemetics

Indications moderately emetogenic chemotherapy or radiotherapy; severely emetogenic chemotherapy; prevention of postoperative nausea and vomiting; treatment of postoperative nausea and vomiting

Cautions pregnancy and breastfeeding; moderate or severe hepatic impairment (max. 8 mg daily)

Side effects constipation; headache, sensation of warmth or flushing, hiccups; occasional alterations in liver enzymes; hypersensitivity reactions reported; occasional transient visual disturbances and dizziness following IV administration; involuntary movements, seizures, chest pain, arrhythmias, hypotension and bradycardia also reported; suppositories may cause rectal irritation

Dose moderately emetogenic chemotherapy or radiotherapy: by oral administration, 8mg 1-2 hours before treatment; by IM injection or slow IV injection, 8mg immediately before treatment; then by oral administration, 8mg every 12 hours for upto 5 days; CHILD, by slow IV injection or IV infusion over 15 minutes, 5mg/m² immediately before treatment then, by oral administration 4mg every 12 hours for upto 5 days; severely emetogenic chemotherapy: by IM injection or slow IV injection, 8mg immediately before treatment, where
necessary followed by 8 mg at intervals of 2-4 hours for 2 further doses (or followed by 1 mg/hour by continuous IV infusion for up to 24 hours); CHILD, by slow IV injection or by IV infusion over 15 minutes, 5 mg/m² immediately before chemotherapy then, 4 mg by mouth every 12 hours for up to 5 days; prevention of postoperative nausea and vomiting: by oral administration, 16mg 1 hour before anaesthesia or 8mg 1 hour before anaesthesia followed by 8mg at intervals of 8 hours for 2 further doses; by IM or slow IV injection, 4mg at induction of anaesthesia; CHILD over 2 years, by slow IV injection, 100mcg/kg (max. 4mg) before, during, or after induction of anaesthesia; treatment of postoperative nausea and vomiting, by IM or slow IV injection, 4mg; CHILD over 2 years, by slow IV injection, 100mcg/kg (max. 4 mg)

**PROMETHAZINE HCl**

Injection, 25mg/ml (2ml) NRH/RRH/DH/BHU
Tablet, 10mg NRH/RRH/DH/BHU

Therapeutic group antiallergies; antiemetics

For details, see promethazine under antiallergies section 5

**Dose by oral administration**
ADULT, 10mg 2-3 times daily up to 20mg 3 times daily; 25mg at night may be preferable in seasonal rhinitis; CHILD, 1mg/kg per day, in divided doses; by IM injection, ADULT, 25-50mg; CHILD, 0.5mg/kg/day in divided doses

Counseling do not drive, may cause drowsiness

Note for IV injection, dilute 1:10 in water for injections

18.2. Antihaemorrhoidal medicines

**ANTIHEMORRHOIDAL**

Ointment (20g) NRH/RRH/DH/BHU

Therapeutic group antihaemorrhoid

Indications symptomatic relief of first degree haemorrhoids and pruritus ani

Cautions for short term use only

**Dose** apply at night and morning, and after bowel movements, externally to the anus or rectally, using the nozzle provided

Counseling apply the ointment as instructed, but also take note of advice about diet and hygiene, which may make the medicine unnecessary in future

18.3. Antispasmodic medicines

**DICYCLOMINE (dicycloverine)**

Injection, 10mg/ml (2ml) NRH/RRH/DH/BHU
Tablet, 10mg NRH/RRH/DH/BHU

Therapeutic group antispasmodic medicines (antimuscarinic)

Indications adjunct in GI disorders characterized by smooth muscle spasm

Contraindications intestinal obstruction, urinary retention, intestinal atony, myasthenia gravis, unstable CVS, reflux oesophagitis; children below 6 months of age

Cautions hepatic or renal disease, autonomic neuropathy, infants, elderly, pregnancy

Interactions see appendix 1 under antimuscarinics
Side effects dry mouth with difficulty in swallowing and thirst, dilation of pupils with loss of accommodation and sensitivity to light, increased intraocular pressure, flushing, dry skin, bradycardia, urinary retention, confusion, excitement, hallucination and delirium

**Dose by oral administration**, ADULT, 10-20mg 3-4 times daily; CHILD, 6-24 months, 5-10mg 3-4 times daily, 15 minutes before feeds; CHILD 2-12 years, 10mg 3 times daily; **by IM injection**, 20mg repeated 4-6 hourly as required, max 80mg daily; CHILD over 2 years, 10mg every 6 hours, Max 40mg daily.

**Counseling** take 30 minutes before meal; take plenty of fluids while taking this medicine

**ATROPINE SULPHATE**
Injection, 1mg/ml (1ml) NRH/RRH/DH/BHU

**Therapeutic group** antispasmodic; antidote (antimuscarinics)

**For details, refer atropine under antidotes**

**Dose spasmolytic: by IM injection**, 1mg with appropriate analgesia

**18.4. Laxatives**

**GLYCERINE**

Suppositories (4g) NRH/RRH/DH

**Therapeutic group** laxatives

**Indications** constipation

**Contraindications** intestinal obstruction

**Dose** 1 suppository moistened with water before insertion

**MAGNESIUM SULPHATE**

Powder (400g) NRH/RRH/DH/BHU

**Therapeutic group** laxatives

**Indications** rapid bowel evacuation prior to bowel surgery, and as an adjunct to niclosamide treatment for tapeworm infestation

**Contraindications** acute GI conditions and obstruction

**Cautions** renal impairment, elderly or debilitated patients

**Interactions** see appendix 1

**Side effects** colic is common

**Dose by oral administration**, 5-10g in 150ml of water; before surgery, this dose may be repeated at 2 hour intervals

**SENNA**

Tablet, 7.5mg NRH/RRH/DH/BHU

**Therapeutic group** laxatives

**Indications** constipation; evacuation before radiology or surgery

**Contraindications** intestinal obstruction

**Cautions** avoid prolonged use; avoid in children

**Side effects** abdominal cramps

**Dose by oral administration**, ADULT, 2-4 tablets at night, initial dose should be low then gradually increased; CHILD 2-4 years ½-2 tablets once daily; CHILD 4-6 years ½-4 tablets once daily; CHILD 6-18 years 1-4 tablets once daily
LACTULOSE

Solution, 10mg/15ml (100ml) NRH/RRH/DH

Therapeutic group laxatives

Indications constipation; hepatic encephalopathy

Contraindications galactosaemia; intestinal obstruction

Side effects flatulence, cramps and abdominal discomfort.

Dose by oral administration, constipation: ADULT, 15ml twice daily, then gradually reduced; CHILD 6-12 years, 10ml twice daily, then gradually reduced; 1-5 years, 5ml twice daily, then gradually reduced; under 1 year, 2.5ml twice daily, then gradually reduced; hepatic encephalopathy: ADULT, 30-50ml 3 times daily, then adjusted to produce 2-3 soft stools daily

18.5. Medicines used in diarrhoea

18.5.1. Oral Rehydration

ORAL REHYDRATION SALT (ORS)

Powder for reconstitution (1g) NRH/RRH/DH/BHU

Therapeutic group medicines used in diarrhoea

Indications prevention and treatment of dehydration

Cautions renal impairment; always assess dehydration; ask about blood in the stool; check for pyrexia and severe malnutrition

Dose according to fluid loss, usually 200-400ml solution after every loose motion; moderate dehydration: by oral administration, INFANT up to 4 months, 200 to 400ml; 4 months up to 12 months, 400 to 700 ml; CHILD 12 months up to 2 years, 700 to 900 ml;2 years up to 5 years 900 to 1400 ml; severe dehydration, start IV immediately; if the child can drink, give ORS by mouth while the drip is set up; Give 100ml/kg Ringer's lactate solution (or, if not available, 0.9% sodium chloride), divided as follows: INFANT under 12 months, give 30ml/kg in the 1st hour and 70ml/kg from the 5th hour; CHILD 12 months up to 5 years, give 30ml/kg in the first ½ hour and 70ml/kg from 2 ½ hours; repeat once if radial pulse is still very weak or not detectable; reassess the child every 1-2 hours; if hydration status is not improving, give the IV drip more rapidly; also give ORS (about 5ml/kg/hour) as soon as the child can drink; usually after 3-4 hours (infants) and 1-2 hours (children); reassess an infant after 6 hours and a child after 3 hours

Counseling dissolve 1 packet in a litre of boiled and cooled water and take small sips throughout the day; if you cannot finish the solution in 24 hrs, throw it away and prepare fresh one

18.5.2 Antimotility

CODEINE PHOSPHATE

Tablet, 15mg NRH/RRH/DH

Therapeutic group opioid analgesic, antidiarrhoeal

For details, refer codeine phosphate under section 3

Dose by oral administration, ADULT, 15-30 mg two to three times daily; not recommended for diarrhoea in children
19. Diuretics

19.1 Osmotic diuretic

**MANNITOL**

Injection, 20% (350ml)  
Therapeutic group: osmotic diuretics  
Indications: forced diuresis in impending renal failure, and in excretion of poisons; emergency reduction of intracranial pressure, cerebral oedema, and intraocular pressure  
Contraindications: established anuria from severe renal disease, congestive cardiac failure, severe dehydration, active intracranial bleeding  
Cautions: fluid and electrolyte balance and urinary flow must be monitored; do not mix with whole blood infusion; only use in pregnancy if benefit to mother clearly outweighs risk to foetus  
Side effects: fluid and electrolyte imbalance associated with fluid retention or fluid depletion; occasional idiosyncratic reactions  
Dose: by IV infusion, renal failure: 1ml/kg infused over 5 minutes and repeated after 2-3 hours; if no response, reassess the patient; if urine flow does increase, 250-500ml over 5 minutes; poisoning: up to 1 litre per 24 hours may be infused, as long as urine output remains high; emergency pressure reduction: 7.5ml/kg given over 30 minutes; CHILD: 5ml/kg stat, then 2ml/kg 3-4 times a day  
Note: if crystals are found in the bottle, warm gently to dissolve before use

19.2 Thiazide Diuretic

**HYDROCHLOROTHIAZIDE**

Tablet, 25mg  
Therapeutic group: antihypertensive; diuretics; medicines used in heart failure  
For details, refer section 12.3 and 12.4

19.3 Loop Diuretic

**FUROSEMIDE**

Injection, 10mg/ml (2ml)  
Tablet 40mg  
Therapeutic group: loop Diuretics; antihypertensive  
For details, refer see section 12.3

19.4 Potassium sparing diuretic

**SPIRONOLACTONE**

Tablet, 25mg  
Therapeutic group: potassium sparing diuretics; antihypertensive; medicines used in heart failure  
For details, refer section 12.3 and 12.4

20. Genitourinary medicines

20.1 Medicines for urinary incontinence

**OXYBUTYNIN**

Tablet, 2.5mg  
Therapeutic group: antimuscarinic
**Indications** urinary frequency, urgency and incontinence; neurogenic bladder disorders instability, and as an adjunct to non-pharmacological therapy for nocturnal enuresis

**Contraindications** myasthenia gravis, bladder outflow obstruction or urinary retention, severe ulcerative colitis, toxic mega colon, and in gastro-intestinal obstruction or intestinal atony; breast feeding; allergy to oxybutynin

**Cautions** minimal doses should be considered to start with, in elderly and children; should be used with caution in open angle glaucoma, hepatic and renal impairment; pregnancy

**Interactions** the effects of atropine and other antimuscarinics may be enhanced by the concomitant use of other medicines with antimuscarinic properties, such as sedating antihistamines, phenothiazines and tricyclic antidepressants; antimuscarinics may also antagonise the GI effects of domperidone and metoclopramide

**Side effects** typical anticholinergic side effects such as dryness of mouth, constipation, flatulence and taste disturbances, dryness of eyes, blurred vision, dizziness, headache, fatigue, palpitation, difficulty in micturition, heat intolerance and dryness of skin

**Dose** by oral administration, ADULT, 5 mg 2 times increased to 3 times if required; ELDERLY, 2.5mg 2 times initially, increased to 5 mg 2 times if necessary

**Counseling** do not stop taking this medicine except on your doctor’s advice; do not drive or operate machinery

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**20.2 Medicines for Benign Prostatic Hypertrophy**

**TAMSULOSIN**

Tablet, 0.4mg

**Therapeutic group** medicines used in benign prostatic hypertrophy (selective α1 blocker)

**Indications** symptomatic relief in benign prostatic hypertrophy

**Side effects** headache, rhinitis, dizziness, back pain

**Contraindications** allergy to tamsulosin

**Dose** by oral administration, ADULT, 0.4mg once daily

**Counseling** dizziness on standing may occur especially when starting treatment or dose is increased; stop the treatment if there is no benefit after 4-6 weeks of maximal treatment

**FINASTERIDE**

Tablet, 5mg

**Therapeutic group** 5α reductase inhibitor

**Indications** benign prostatic hyperplasia

**Side effects** libido, erectile dysfunction, ejaculation disorders, and reduced volume of ejaculate; rarely gynaecomastia

**Cautions** hepatic impairment; obstructive uropathy

**Interactions** antacids containing aluminium and magnesium salts may reduce absorption from gastrointestinal tract

**Dose** by oral administration, 5mg daily
Counseling take in the morning after breakfast

21. Hormones, other endocrine medicines and contraceptives

21.1 Adrenal hormones & synthetic substitutes

**HYDROCORTISONE SODIUM SUCCINATE**

Injection, 100mg/ml NRH/RRH/DH

**Therapeutic group** antiallergies; adrenal hormones and synthetic substitutes (corticosteroids)

**Indications** adjunct in the emergency treatment of anaphylaxis; inflammatory skin conditions; inflammatory bowel disease; adrenocortical insufficiency

**Contraindications** known hypersensitivity to hydrocortisone, or any other corticosteroid; systemic fungal infections unless needed to control medicine reactions due to amphotericin B; concurrent administration of live virus vaccines in patients receiving immunosuppressive doses of corticosteroids; IM administration for conditions prone to bleeding (e.g., idiopathic thrombocytopenic purpura)

**Dose by IM or slow IV or infusion.** 100-500 mg, 3-4 times in 24 hours or as required; CHILD, by slow IV injection up to 1 year 25 mg, 1-5 years 50 mg, 6-12 years 100 mg

**PREDNISOLONE**

Tablet 5mg and 20mg NRH/RRH/DH

**Therapeutic group** antiallergies; adrenal hormones and synthetic substitutes (corticosteroids)

**For details, refer prednisolone under section 3**

**Dose:** by oral administration, initially, 10-30mg (occasionally 60mg) daily; maintenance: 2.5-15mg daily; CHILD, 0.5mg/kg

**TRIAMCINOLONE ACETONIDE**

Injection, 40mg/ml (1ml) NRH

**Therapeutic group** adrenal hormones and synthetic substitutes (corticosteroids)

**Indications** severe inflammatory skin disorders such as eczema unresponsive to less potent corticosteroids; psoriasis, local inflammation of joints (especially in RA), and soft tissues

**Contraindications** local/systemic fungal infections, septic arthritis, herpes simplex, hypersensitivity, lactation, peptic ulcer, osteoporosis (long term use), history of glucocorticoid induced myopathy

**Cautions** repeated infections may lead to Cushingoid’s syndrome, or to local necrosis and muscle wasting; full aseptic precautions must be taken; in tendonitis, the injection should be into the synovial sheath, not into the tendon itself; not recommended for children below 6 years

**Interactions** see appendix 1 under corticosteroids

**Side effects** Cushing’s syndrome, growth retardation in children, osteoporosis, vertebral compression, glaucoma, hyperglycaemia, nocturia, obesity, facial rounding, increased fragility of skin and behavioural changes

**Dose by deep IM injection.** ADULT, 2.5-60mg/day; CHILD (6-12 years), 40mg; By intra-articular injection, 2.5-40mg according to joint size, to a maximum of 80mg in multiple injections; by intraleisional injection, 2-3mg; maximum 30mg in multiple injections; doses are repeated every 1-2 weeks according to response
DEXAMETHASONE

Injection, 4mg/ml (2ml) NRH/RHR/DH/BHU
Tablet 4mg NRH/RRH

Therapeutic group corticosteroids

Indications suppression of inflammatory and allergic disorders; congenital adrenal hyperplasia, cerebral oedema associated with malignancy, as an adjunct therapy in chemotherapy induced nausea and vomiting

Contraindications hypersensitivity to corticosteroids or any ingredient in the formulation

Cautions hypertension; hypothyroidism; congestive heart failure or recent myocardial infarction; liver failure; renal insufficiency; diabetes mellitus or in those with a family history of diabetes; osteoporosis; glaucoma; patients with a history of severe affective disorders particularly of steroid induced psychoses; epilepsy and/or seizure disorder; peptic ulceration; previous steroid myopathy; tuberculosis; patients with myasthenia gravis receiving anticholinesterase therapy

Interactions aminogluthethimide; amphotericin B injection and potassium depleting agents; macrolides; anticholinesterases; warfarin; anti-diabetics;isoniazid; cholestyramine; mifepristone; cyclosporine; digitalis glycosides; ephedrine; oestrogens, including oral contraceptives; hepatic enzyme inducers, inhibitors and substrates (e.g. barbiturates, phenytoin, carbamazepine, rifampin); ketoconazole; NSAIDs; diuretics; sympathomimetic (salbutamol, salmeterol); vaccines; antacids

Side effects adrenal suppression, swelling, rapid weight gain, GI perforation, mood changes, acne, dry skin, bruising or discoloration, glucose intolerance, slow wound healing, muscle weakness, changes in the shape or location of body fat, osteoporosis

Dose by oral administration, ADULT, 0.5-10mg daily; CHILD, 10-100mcgs/kg daily; by IM injection or slow IV injection or IV infusion, 0.5-24mg; CHILD, 200-400mcg/kg daily

Counseling to be taken with or after meals; do not stop the medicine unless advised by the physician

21.2. Ovulation inducers

CLOMIPHENE

Tablet, 50mg NRH/RRH

Therapeutic group ovulation inducers

Indications anovulatory infertility

Contraindications hepatic disease, ovarian cysts, endometrial carcinoma, pregnancy, undiagnosed or abnormal vaginal bleeding

Cautions polycystic ovary syndrome: risk of over-stimulation and multiple pregnancies; breast-feeding

Side effects visual disturbance - withdraw treatment; hot flushes, abdominal discomfort; occasionally nausea, vomiting depression, insomnia, breast tenderness, weight gain, rashes, dizziness and hair loss, headache, intermenstrual spotting, menorrhagia, endometriosis, convulsions

Dose by oral administration, 50 mg daily for 5 days, starting within about 5 days of onset of menstruation (preferably on 2nd day) or at any time (normally preceded by a progestogen-induced withdrawal bleed) if cycles have ceased;
second course of 100mg daily for 5 days may be given in absence of ovulation; most patients who are going to respond will do so to first course; 3 courses should constitute adequate therapeutic trial; long term cyclical therapy not recommended; male infertility: 25mg/day for 3 months

21.3 Contraceptives
21.3.1 Hormonal contraceptives

**LEVONORGESTREL + ETHINYLIOESTRADIOL**

Tablet, (0.3mg + 0.03mg) NRH/RRH/DH/BHU

**Therapeutic group** hormonal contraceptives

**Indications** contraception, primary amenorrhea, dysfunctional uterine bleeding, endometriosis, menorrhagia and chronic pelvic pain

**Contraindications** pregnancy, breastfeeding (until weaning or for first 6 months post-partum), history of thromboembolism, active liver disease, undiagnosed vaginal bleeding, breast, and uterine or other hormone-dependent cancers

**Cautions** diabetes, hypertension, cardiac or renal disease, migraine, epilepsy may all be made worse; varicose veins, inflammatory bowel disease including Crohn's disease, cigarette smoking, obesity, and age over 35 years may all predispose to thromboembolic disease

**Interactions** see appendix 1 under oral contraceptives

**Side effects** nausea and vomiting are common in the first few weeks; thromboembolism is more common than in the normal population in patient over 35 years old and smokers

**Dose** by oral administration, 1 pill daily

**Counseling** tablets should be taken daily, at the same time of each day; if you miss more than 2 tablets, avoid sex for at least for 7 days, or use a condom or emergency contraceptive pills, and continue taking the tablets regularly so that you are protected after that

**Note** except after delivery, contraceptive pills should be started within 5 days of the start of menstruation; they should not be started less than 4 weeks after delivery, once breastfeeding is fully established; oral contraceptives should be discontinued one month before elective surgery

**LEVONORGESTREL**

Tablet, 750mcg NRH/RRH/DH

**Therapeutic group** hormonal contraceptives

**Indications** emergency hormonal contraception

**Contraindications** severe liver disease, porphyria

**Cautions** avoid repeated use

**Side effects** nausea, vomiting, headache, dizziness, breast discomfort, depression, skin disorders, disturbances of appetite, irregular menstrual period

**Interactions** see appendix 1 under oral contraceptives and progestogens

**Dose** by oral administration, 1.5 mg (two tabs) as a single dose as soon as possible after unprotected sex (preferably within 12 hours but no later than after 72 hours) or a tablet each 12 hours apart

**MEDROXYPROGESTERONE ACETATE DEPOT (DMPA)**

Injection, 150mg/1ml NRH/RRH/DH/BHU
Therapeutic group hormonal contraceptives

Indications contraception

Contraindications pregnancy, undiagnosed vaginal bleeding, history or family history of arterial disease; liver adenoma; after hydatidiform mole (until HCG normal); breast and other hormone-dependent cancers

Cautions diabetes, hypertension, heart disease, ovarian cysts, malabsorption syndromes, migraine, active liver disease, recent cholestatic jaundice or history of jaundice in pregnancy

Interactions see appendix 1 under progestogens

Side effects irregular menstruation or amenorrhoea (50%) are normal, and may extend beyond the treatment period; nausea and vomiting, headache, breast tenderness, depression, skin disorders and weight changes may sometimes occur; delayed return of fertility (max 24 months)

Dose by deep IM injection, (gluteal muscle in average and thin patients and deltoid muscle in obese patients) 150 mg within first 5 days of cycle or within first 5 days after delivery (delay until 6 weeks after delivery if breastfeeding); for long-term contraception, repeated every 12 weeks (if interval greater than 12 weeks and 5 days, exclude pregnancy before next injection and advise patient to use additional contraceptive measures (e.g. barrier) for 14 days after the injection

Counseling your menstrual cycle will be irregular, or may even stop; but as long as you come regularly for injections, there is no risk of you becoming pregnant

NORETHISTERONE

Injection, 200mg/ml NRH/RRH/DH/BHU

Therapeutic group hormonal contraceptives

Indications contraception (short term)

Contraindications see under medroxyprogesterone acetate

Cautions see under medroxyprogesterone acetate

Side effects bloating, breast discomfort, headache, dizziness, depression, nausea, menstrual irregularities, delayed return to fertility; rarely weight gain; injection site reactions

Dose by IM injection, 200mg within the first 7 days of menstrual cycle or immediately after parturition; repeated after 2 months

Counseling it is recommended that before treatment, women receive full counselling about the likelihood of menstrual irregularities and the potential of delay in the return to full fertility
21.4 Oestrogens

ETHINLOESTRADIOL

Tablet, 50mcg NRH/RRH/DH/BHU

Therapeutic group oestrogens

Indications post DMPA bleeding

Contraindications pregnancy, oestrogen-dependent cancer, history of thromboembolism, hepatic impairment, endometriosis and undiagnosed vaginal bleeding

Cautions oestrogen predisposes to thromboembolism and, in prolonged courses, to endometrial cancer; care is needed in diabetes, epilepsy, migraine, cardiac or renal disease

Interactions see appendix 1 under oestrogens

Side effects nausea, vomiting, headache, breast tenderness and weight gain may occur; changes in libido, depression, and amenorrhoea occur occasionally; thromboembolism is more common than in the normal population

Dose by oral administration, 10-20mcg daily for 20 days for DMPA bleeding; if given as hormone replacement therapies, add medroxyprogesterone

Note for primary amenorrhoea, the combined oral contraceptive may be more convenient in establishing cyclical bleeding

CONJUGATED OESTROGEN

Tablet, 0.625mg NRH/RRH

Therapeutic group conjugated oestrogens

Indications menopause, osteoporosis, prostatic carcinoma, atrophic vaginitis/urethritis

Contraindications breast carcinoma, hepatic impairment, thromboembolic disorders, vaginal bleeding of unknown cause, suspected oestrogen dependent neoplasia

Cautions migraine, epilepsy, asthma, renal and cardiac disease, recurrent and chronic mastitis, may cause retention of salt and water, abnormal mammograms; to discontinue if cancer progression or hypercalcaemia occurs, uterine fibromyomata.

Interactions see appendix 1 under oestrogens

Side effects nausea, vomiting, breakthrough bleeding, breast tenderness, breast enlargement

Dose by oral administration, moderate to severe vasomotor symptoms associated with climacteric: 0.625-1.25mg daily; atrophic vaginitis/urethritis: 0.3mg-1.25mg daily depending on response; osteoporosis: 0.625mg daily; female hypogonadism: 2.5mg-7.5mg daily in divided doses for 20 days, then no tablet for 10 days, if no bleeding, repeat same; primary ovarian failure: 1.25mg daily, adjust upward or downward as per response; oestrogen replenishment: 0.625mg daily; not recommended for children

21.5 Progestogens

MEDROXYPROGESTERONE ACETATE

Tablet, 10mg NRH/RRH

Therapeutic group progestogens
Indications dysfunctional uterine bleeding, secondary amenorrhea, mild to moderate endometriosis and postmenopausal syndrome

Contraindications pregnancy, undiagnosed vaginal bleeding, hepatic impairment or active liver disease, breast or genital tract carcinoma; porphyria

Cautions diabetes, hypertension, cardiac and renal failure

Interactions see appendix 1 under progestogens

Side effects acne, urticaria, fluid retention, weight changes, GI disturbances, changes in libido, breast discomfort, premenstrual symptoms, irregular menstrual cycles; also depression, insomnia, somnolence, alopecia, hirsutism, anaphylactoid-like reaction and rarely jaundice

Dose by oral administration, 2.5-10mg daily for 5-10 days beginning 16th-21st day of cycle, repeated for 2 cycles in dysfunctional uterine bleeding (DUB); secondary amenorrhea: 3 cycles; mild to moderate endometriosis: 10mg 3 times daily for 90 consecutive days, beginning on the 1st day of cycle

21.6 Insulin & other antidiabetic agents

HUMAN INSULIN

Isophane, 40 units/ml (10ml) NRH/RRH/DH
Mixtard, (neutral + isophane) 30:70 (10ml) NRH/RRH/DH
Soluble, 40 units/ml inj, (10ml) NRH/RRH/DH

Therapeutic group antidiabetic agents

Indications diabetes mellitus

Cautions renal impairment; changes in life style/meal timing, trauma, infections and pregnancy can all affect dose requirement

Side effects hypoglycaemia; minor allergic reactions at injection sites during the first weeks of treatment are common; fat hypertrophy or atrophy may occur, but are limited by rotating injection sites used; transient oedema, this may be reduced by rotating injection sites; overdose causes hypoglycaemia

Dose by subcutaneous injections (and soluble only: IM, IV or infusion): adjusted according to patient’s requirements.

Note short acting Insulin: when injected subcutaneously has a rapid onset of action (30 to 60 minutes), a peak action between 2 to 4 hours, and duration of action up to 8 hours; intermediate Insulin and long acting: when given by subcutaneous injection, intermediate and long acting insulin have an onset of action of approximately 1-2 hours, a maximal effect at 4-12 hours, and duration of action 16-35 hours

GLIPIZIDE

Tablet, 5mg NRH/RRH/DH

Therapeutic group oral antidiabetic agent (sulfonylureas)

Indications diabetes mellitus type II; preferred in elderly patients

Contraindications should be avoided in severe hepatic and renal impairment and in porphyria; should not be used while breastfeeding and insulin therapy should be substituted during pregnancy; ketoacidosis

Cautions increased risk of severe hypoglycaemia in elderly, debilitated patients and in patients with hepatic or renal impairment; risk of hypoglycaemia when caloric intake is deficient or after strenuous exercise
Interactions  its hypoglycaemic action may be potentiated by alcohol, fluconazole, β-blockers, and possibly ACE inhibitors

Side effects  GI side effects such as nausea, vomiting, diarrhoea and constipation; dizziness and drowsiness may also occur

Dose by oral administration, initially 2.5-5mg daily adjusted according to response; maximum 40mg in divided doses

Counseling preferably taken shortly before breakfast or lunch

**METFORMIN**

Tablet, 500mg  NRH/RRH/DH/BHU

Therapeutic group oral antidiabetic agents (biguanides)

Indications type II diabetes and in overweight patients

Contraindications hepatic or renal impairment (withdraw if renal impairment suspected); predisposition to lactic acidosis, heart failure, severe infection or trauma, dehydration, alcohol dependence; in pregnancy and breastfeeding, it is normally substituted with insulin

Cautions serious infections, trauma, surgery, avoid alcohol

Interactions see appendix 1 under antidiabetics

Side effects lactic acidosis seen in presence of renal failure and alcoholism; minor transient anorexia, nausea, vomiting, diarrhoea, occasionally metallic taste, urticaria, malabsorption of vitamin B₁₂

Dose by oral administration, initially 500 mg with breakfast for at least 1 week, then 500 mg with breakfast and evening meal for at least 1 week, and then 500 mg with breakfast, lunch and evening meal; max. 3 g daily in divided doses though it is preferable to limit this to 2 g daily

**PIOGLITAZONE**

Tablet, 15mg  NRH/RRH/DH

Therapeutic group oral antidiabetic agents

Indications type II diabetes mellitus (alone or combined with metformin or a sulphonylurea)

Contraindications hepatic impairment, history of heart failure, combination with insulin (risk of heart failure), pregnancy (insulin is normally substituted in all diabetics), breastfeeding

Cautions monitor liver function (see below); cardiovascular disease (risk of heart failure)

Note liver toxicity: rare reports of liver dysfunction; monitor liver function before treatment, then every 2 months for 12 months and periodically thereafter; advise patients to seek immediate medical attention if symptoms such as nausea, vomiting, abdominal pain, fatigue and dark urine develop; discontinue if jaundice occurs

Side effects GI disturbances, weight gain, oedema, anaemia, headache, visual disturbances, dizziness, arthralgia, hypoesthesia, haematuria, impotence; less commonly hypoglycaemia, fatigue, insomnia, vertigo, sweating, altered blood lipids, proteinuria

Dose: by oral administration, initially 15-30 mg once daily, increased to 45 mg once daily according to response
21.7 Thyroid hormones and antithyroid medicines

21.7.1 Thyroid hormones

**THYROID HORMONES**

**Tablet, 100mcg**

**Therapeutic group** thyroid hormones

**Indications** hypothyroidism (myxoedema); diffuse non-toxic goitre; Hashimoto’s thyroiditis; thyroid carcinoma

**Contraindications** thyrotoxicosis

**Cautions** neonatal hypothyroidism needs early recognition and prompt treatment if normal development is to be achieved; care in cardiovascular disorder, after prolonged myxoedema, and in adrenal insufficiency

**Interactions** see appendix 1 under thyroid hormones

**Side effects** arrhythmia, angina, tachycardia, skeletal muscle cramps, headache, restlessness, excitability, flushing, sweating, diarrhoea and excessive weight loss

**Dose** by oral administration, ADULT, 50mcg daily before breakfast; ELDERLY half or quarter dose of adult, increasing very gradually; maintenance dose of 0.2mg daily may be needed; CHILD, 10 mcg/kg up to a maximum of 50mcg should be given; subsequent therapy should reach 100 mcg by 5 years, and may reach the upper adult dose by 12 years, guided by clinical response, growth assessment and laboratory results

**Counseling** take this medicine regularly; do not stop taking it without medical advice

21.7.2 Antithyroid medicines

**CARBIMAZOLE**

**Tablet, 5mg**

**Therapeutic group** antithyroid medicines

**Indications** hyperthyroidism

**Cautions** liver disorders, pregnancy, breastfeeding

**Side effects** nausea, mild GI disturbances, headache, rashes and pruritis, arthralgia; rarely myopathy, alopecia, bone marrow suppression, jaundice

**Dose** by oral administration, ADULT, 30-60mg daily in divided doses until the patient is euthyroid, usually 4-8 weeks; maintenance dose of 5-15mg daily; CHILD, 15mg daily in divided doses adjusted as required

**Counseling** warn patient to report immediately if sore throat, mouth ulcers, bruising, fever, malaise, or non-specific illness develops; blood test should be advised at regular intervals

**PROPRANOLOL**

**Tablet, 40mg**

**Therapeutic group** antimigraine; antiarrhythmic; antiangina; antithyroid medicines

**Indications** prophylaxis of migraine, treatment of angina, arrhythmias, and hyperthyroidism

For details, refer propranolol under antimigraine medicines

**Dose** by oral administration, hyperthyroidism: 10-40mg 3-4 times daily
**Counseling** do not stop taking this medicine except on physician’s advice

**WEAK IODINE SOLUTION**

Lugol’s iodine (extemporaneous preparation)  
NRH/RRH/DH

**Therapeutic group** antithyroid medicines

**Indications** suppression of thyroid toxicity prior to thyroidectomy and thyroid storm

**Contraindications** hypersensitivity, especially on the skin; avoid oral use while breastfeeding

**Cautions** not for long term use

**Side effects and over dosage** oral hypersensitivity reactions include irritation of conjunctiva and respiratory mucous membranes, headaches and salivary gland pain; **overdose**: depression, insomnia, impotence and myxoedema may occur

**Dose by oral administration**, 0.1-0.3ml 3 times daily diluted in a cup of milk or water

21.8 Medicines used in calcium metabolism

**IBANDRONATE**

Tablet, 150mg  
NRH/RRH

**Therapeutic group** calcium metabolism modifier (bisphosphonate)

**Indications** treatment and prevention of osteoporosis in post menopausal women; reduction of bone damage in bone metastases in breast cancer

**Contraindications** hypersensitivity; pregnancy

**Cautions** renal impairment (monitor renal function and serum calcium, phosphate and magnesium), cardiac disease and breastfeeding

**Interactions** see appendix 1

**Side effects** hypocalcaemia, hypophosphataemia, influenza like symptoms, bone pain; diarrhoea, nausea, vomiting, abdominal pain, dyspepsia, pharyngitis, oesophageal reactions; headache, hypersensitivity reactions, angioedema and bronchospasm

**Dose by oral administration**, **post-menopausal osteoporosis**: 150mg once a month; **reduction of bone damage in bone metastases in breast cancer**: 50mg daily

**Counseling** tablet should be swallowed whole with plenty of water in upright position; to be taken on empty stomach at least 1 hour before breakfast (or any other oral medicines); patient should be in upright position for at least 1 hour after taking tablet

22. Medicines used in obstetrics

**MAGNESIUM SULPHATE**

Injection, 50% (2ml)  
NRH/RRH/DH

**Therapeutic group** anticonvulsant

**Indications** prevention of recurrent seizures in eclampsia; prevention of seizures in pre-eclampsia

**Cautions** hepatic impairment; renal impairment monitor blood pressure for signs of over dosage weakness, nausea, sensation of warmth, flushing, drowsiness, double vision, and slurred speech, pregnancy
Interactions see appendix 1

Side effects respiratory depression, oliguria, neuro muscular depression and muscle weakness

**Dose prevention of recurrent seizures in eclampsia:** by IV injection, initially 4g over 5-15 minutes followed either by IV infusion, 1g/hour for at least 24 hours after the last seizure or delivery (whichever occurs later) or by deep IM injection, 5g into each buttock, then 5g every 4 hours into alternate buttocks for at least 24 hours after the last seizure or delivery; recurrence of seizures may require an additional IV injection of 2g (4g, if body weight over 70kg); **prevention of seizures in pre-eclampsia:** by IV injection, initially 4g over 5-15 minutes followed either by IV infusion, 1g/hour for 24 hours or by deep IM injection, 5g into each buttock, then 5g every 4 hours into alternate buttocks for at least 24 hours; if seizure occurs, give an additional dose by IV injection of 2g

**Note** for IV injection, concentration of magnesium sulphate should not exceed 20% (dilute 1 part of magnesium sulphate injection, 50%, with at least 1.5 parts of water for injections); for IM injection, mix magnesium sulphate injection, 50%, with 1ml of lignocaine injection 2%

**22.1 Oxytocic**

**METHYLERGOMETRINE**

Injection, 200mcg/ml (1ml) NRH/RRH/DH/BHU
Tablet, 0.125mg NRH/RRH/DH/BHU

**Therapeutic group** oxytocic

**Indications** third stage of labour; post-partum haemorrhage; sub-involution of the uterus; incomplete abortion

**Contraindications** antepartum haemorrhage; first and second stage of labour; impaired pulmonary, hepatic or renal function, severe hypertension, sepsis

**Cautions** pre-eclampsia and eclampsia; cardiac disease; sepsis; also exclude multiple pregnancy

**Interactions** see appendix 1 under ergotamine and ergometrine.

**Side effects** nausea, vomiting, transient hypertension, vasoconstriction

**Dose by oral administration**, 1-2 tablets 3 times daily, maximum 3 days; **by IM injection, labour**: 0.2mg when anterior shoulder is delivered or immediately after birth; **PPH**: by IV injection, 0.25-0.5mg when anterior shoulder is delivered or immediately after birth

**Note** to control bleeding in incomplete abortion, oxytocin should be used as well; the uterus in early pregnancy responds better to the combination than to either medicine alone

**OXYTOCIN**

Injection, 5 units/1ml NRH/RRH/DH/BHU

**Therapeutic group** oxytocic

**Indications** induction and augmentation of labour; and management of third stage labour in referral hospitals/with gynecologist; active management of third stage labour in district hospital and BHU

**Contraindications** hypertonia of uterus; mechanical obstruction to delivery; failed trial of labour; severe pre-eclampsia; foetal distress; placenta praevia

**Cautions** hypertension; high parity, previous caesarean section, multiple pregnancies
Interactions see appendix 1 under oxytocin

Side effects high doses cause violent uterine contractions leading to uterine rupture and/or foetal asphyxiation; arrhythmias, maternal hypertension and sub-arachnoid haemorrhage may also occur

Dose by IV infusion, infuse 10 units in 500ml IV fluids at 60 drops per minute; maintenance dose: infuse 10 units in 500ml IV fluids per minute; maximum dose, not more than 6 pints of IV fluids containing oxytocin

Note do not use as IV bolus; to control bleeding in incomplete abortion, methylergometrine should be used; the uterus in early pregnancy responds better to methylergometrine

MISOPROSTOL

Tablet, 100mcg NRH/RRH

Therapeutic group prostaglandin analogues

Indications induction of labour (dead and live foetus)

Contraindications pregnancy, breastfeeding

Cautions conditions where hypotension might precipitate severe complications (e.g. cerebrovascular disease or cardiovascular disease)

Side effects nausea, vomiting, diarrhoea, abdominal cramps, flatulence

Dose by vaginal administration, induction of labour: initially 25mcg, repeated after 6 hours if necessary; if still no response, increase to 50mcg every 6 hours for up to 4 doses

Note should it be necessary to continue induction of labour with oxytocin, administration of oxytocin should be avoided within 8 hours of using misoprostol

22.2 Antioxytocic

RITODRINE

Injection, 10mg/ml (5ml) NRH

Tablet, 10mg NRH

Therapeutic group tocolytic agent

Indications uncomplicated premature labour between 24-33 weeks of gestation

Contraindications cardiac disease, eclampsia and severe pre-eclampsia, intra-uterine foetal death, antepartum haemorrhage, placenta praevia, cord compression; not for use in first or second trimester

Cautions suspected cardiac disease, hypertension, hyperthyroidism, hypokalaemia, diabetes mellitus, mild to moderate pre-eclampsia; avoid over hydration; concomitant beta-blocker treatment

Side effects nausea, vomiting, flushing, sweating, tachycardia, palpitations, hypotension, uterine bleeding, pulmonary oedema, chest pain or tightness

Dose by IV infusion, initially 50mcg/minute, increased gradually according to response by 50mcg/minuteevery 10 minutes until contraction stops or maternal heart rate reaches 140 beats/minute; continue for 12-48 hours after contraction cease (usual rate 150-350mcg/minute); max. rate 350mcg/minute or by IM injection, 10mg every 3-8 hours continued for 12-48 hours after contraction have ceased; then by oral administration, 10mg 30 minutes before termination of IV infusion, repeated every 2 hours for 24 hours, followed by 10-20mg every 4-6 hours, max. oral dose 120mg daily
23. Ophthalmological Preparations

23.1 Anti-infective agents

**Chloramphenicol**

Eye applicap, 1% (250mg)  
Eye/Ear drop, 0.4% (5ml)

**Therapeutic group** antibacterial

**Indications** bacterial infection

**Side effects** transient burning pain in the eye may be felt; rare reports of aplastic anaemia, due to systemic absorption

**Dose by ocular instillation**, drops: 1-2 drops 2 hourly; reduced once infection is controlled, continue for 48 hours after the eye is white; **applicap**: apply 3-4 times daily

**Counseling** **applicaps**: use a clean blade to cut off the tip of the capsule, and squeeze the ointment into your eye; **drops**: once the course of treatment is finished, throw away the bottle; it is dangerous to use it again later, or to give it to anyone else

**Note** for serious infections, instill drops more frequently; **applicap** is more convenient, and cheaper for most other infections

**CIPROFLOXACIN**

Eye/Ear drop, 0.3 % (5ml)

**Therapeutic group** antibacterial

**Indications** superficial bacterial infections; corneal ulcers, chronic otitis media in patients with perforation of the tympanic membrane; pseudomonal infection of the otitis externa

**Contraindications** hypersensitivity

**Cautions** not recommended for children under 1 year; pregnancy (appendix 7); breast feeding (appendix 8)

**Side effects** eye discomfort and pain; pharyngitis and rhinitis

**Dose by ocular/aural instillation**, **superficial bacterial infection**: apply 1-2 drops (ear; 3-5 drops) 2 hourly; reduce once infection is controlled; continue for 48 hours after the eye is white; **corneal ulcer**: day 1 apply every 15 minutes for 6 hours, then 30 minutes, day 3 apply every hour, days 3-14 apply every 4 hours (max, duration of treatment 21 days)

**Counseling** once the course of treatment is finished, throw away the bottle; it is dangerous to use it again later, or to give it to anyone else

**MOXIFLOXACIN**

Eye drop, 0.5%

**Therapeutic group** antibacterial (fluoroquinolone)

**Indications** bacterial conjunctivitis and corneal ulcers not responding to ciprofloxacin

**Contraindications** hypersensitivity to quinolones

**Side effects** eye discomfort and pain; pharyngitis and rhinitis

**Dose by ocular instillation**, 1 to 2 drops every 8 hours into affected eye(s), for 1 week
TOBRAMYCIN
Eye drop, 0.3% (5ml) NRH/RRH

Therapeutic group antibacterial (aminoglycoside)

Indications external infections of the eye and its adnexa caused by susceptible bacteria

Contraindications hypersensitivity

Cautions hypersensitivity; pregnancy; breastfeeding; if tobramycin is administrated topically in conjunction with systemic aminoglycoside therapy, serum aminoglycoside concentration should be monitored

Side effects localized ocular toxicity and hypersensitivity including increased lacrimation, itching and oedema of the eyelid and conjunctival erythema

Dose by ocular instillation, ADULT and CHILD over 1 year, 1 drop twice daily for 1 week; in severe infection, 1 drop four times daily on the first day, then twice daily for 5 to 7 days

Counseling once the course of treatment is finished, throw away the bottle; it is dangerous to use it again later, or to give it to anyone else; use the solution within one month after opening the container

NEOSPORIN (neomycin+polymixin+bacitracin)
Eye ointment, 5g NRH/RRH

Therapeutic group antibacterial

Indications bacterial infection

Contraindications known sensitivity to any of the components

Dose apply 3-4 times daily

Counseling once the course of treatment is finished, throw away the tube; it is dangerous to use it again later, or to give it to anyone else

ACYCLOVIR
Eye ointment, 3% (5g) NRH/RRH

Therapeutic group antiviral

Indications local treatment of herpes simplex infections

Contraindications known hypersensitivity

Side effects transient burning pain in the eye may be felt.

Dose apply 5 times daily and continue for at least 3 days after complete healing

Counseling once the course of treatment is finished, throw away the remaining ointment; do not use it after 4 weeks of opening; do not share the ointment with another patient

FLUCONAZOLE
Eye drop, 0.3 % (5ml) NRH/RRH

Therapeutic group antifungal

Indications fungal blepharitis, fungal conjunctivitis and fungal keratitis

Contraindications known hypersensitivity

Side effects local sensitivity and irritation
Dose by ocular instillation, fungal blepharitis or conjunctivitis: 1 drop every 4-6 hours; fungal Keratitis: 1 drop every 1-2 hours initially, reduced to 1 drop every 3-4 hours after the first 3 or 4 days

23.2 Anti-inflammatory Agents

PREDNISOLONE ACETATE

Eye/Ear drop, 0.1% (5ml) NRH/RRH

Therapeutic group anti-inflammatory agents (corticosteroids)

Indications local treatment of inflammation (short term)

Cautions should be used under expert supervision

Side effects three main dangers associated with their use: “red eye” where the diagnosis is unconfirmed, maybe due to herpes simplex virus, and a steroid may aggravate the condition, leading to corneal ulceration, with possible damage to vision and even loss of the eye; bacterial, fungal and amoebic infections pose a similar hazard; “steroid glaucoma” may follow the use of corticosteroid eye preparations in susceptible individuals; “steroid cataract” may follow prolonged use; other side effects include thinning of the cornea and the sclera

Dose by ocular instillation, 1-2 drops 4-6 times daily; severe conditions every 30-60 minutes until control of symptoms is achieved, then reduce the frequency; by aural administration, 2-3 drops 3-4 times daily

23.3 Antiglaucoma medicines

23.3.1 Miotic

BRIMONIDINE

Eye drop, 0.2 % (5ml) NRH

Therapeutic group antiglaucoma medicines (sympathomimetic)

Indications raised intra-ocular pressure in open-angle glaucoma or ocular hypertension in patients whom beta-blockers are inappropriate; adjunctive therapy when intra-ocular pressure is being inadequately controlled by other antiglaucoma therapy

Cautions severe cardiovascular disease; cerebral coronary insufficiency, Raynaud’s syndrome, postural hypotension, depression, hepatic or renal impairment; pregnancy, breastfeeding;

Interactions see appendix 1 (alpha adrenoceptor stimulants)

Side effects ocular reactions include hyperaemia, burning, stinging, burning, blurring, pruritis, allergy, and conjunctival follicles; occasionally corneal erosion and staining, photophobia, eyelid inflammation, conjunctivitis; headache, dry mouth, taste alteration, fatigue, dizziness, drowsiness

Dose by ocular instillation, 1 drop 2 times daily

Counseling drowsiness may affect performance of skilled tasks (e.g. driving)

23.3.2 Beta-blockers

TIMOLOL MALEATE

Eye drop 0.5 % (5ml) NRH/RRH/DH

Therapeutic group antiglaucoma medicines (miotics)

Indications raised intra-ocular pressure in primary open-angle glaucoma
Contraindications: systemic absorption may follow topical application therefore eye drops containing a beta-blocker are contra-indicated in patients with bradycardia, heart block, or uncontrolled heart failure; asthma

Side effects: ocular stinging, burning, pain, itching, erythema, dry eyes and allergic reactions including anaphylaxis and blepharoconjunctivitis; occasionally corneal disorders

Dose by oculer instillation, 1 drop 2 times daily

23.3.3 Carbonic anhydrase inhibitors

ACETAZOLAMIDE

Tablet, 250mg

Therapeutic group: antiglaucoma medicines; diuretics

Indications: open angle glaucoma, secondary glaucoma, hydrocephalus

Contraindications: severe renal and hepatic impairment, hypokalaemia, hyponatraemia

Cautions: pregnancy, may cause neonatal thrombocytopenia; diabetes, breastfeeding; not for prolonged use

Interactions: see appendix 1 under diuretics

Side effects: diuresis: parasthesia, hypokalaemia, loss of appetite, drowsiness and depression may occur, especially in the elderly; nausea, vomiting, diarrhoea, taste disturbance

Dose by oral administration, ADULT, 250–750 mg/day in divided doses; CHILD, 8-30mg/kg daily, max of 750 mg; mountain sickness: prophylactic: 125 to 250mg twice daily starting 1 or 2 days before and continuing for 3 days once the highest altitude is reached; treatment: 250 mg twice a day for about 3 days

Counseling: may cause drowsiness; if affected do not drive or operate machinery

DORZOLAMIDE

Eye drop, 2% (5ml)

Therapeutic group: antiglaucoma (carbonic anhydrase inhibitor)

Indications: glaucoma

Contraindications: severe renal impairment (CrCl<30mL/min)

Side effects: burning and stinging sensation, bitter taste, visual disturbances

Dose by oculer instillation, 1 drop to the affected eye 3-4 times a day

23.3.4 Cholinergics

PILOCARPINE

Eye drop, 2% (5ml)

Therapeutic group: antiglaucoma medicines

Indications: glaucoma

Contraindications: hypersensitivity to pilocarpine or any other components in the formulation; acute inflammatory disease of the anterior segment of the eye

Cautions: treatment should be stopped, if symptoms of systemic toxicity develop, and before surgery on the eye as there is an increased risk of hyphemia
Side effects: ciliary spasm, ocular pain and irritation, blurred vision, lachrymation, myopia, and browache; conjunctival vascular congestion, superficial keratitis, vitreous haemorrhage, and lens opacities may occur after prolonged use.

Dose by ocular instillation: 1-2 drops up to 4 times daily, adjusted according to response.

Counseling: pupillary constriction leads blurred vision and difficulty with dark adaptation and caution is necessary with night driving or when hazardous tasks are undertaken in poor illumination; miotics should not be used by patients wearing soft contact lenses.

23.4 Mydriatic and cyclopegics

**ATROPINE**

Eye ointment, 1% (5g) NRH/RRH/DH

Therapeutic group: mydriatics and cycloplegic.

Indications: refraction procedures in young children; anterior uveitis.

Contraindications: glaucoma.

Cautions: dilatation of the pupil may precipitate acute glaucoma, especially in the elderly; the action of the medicine may persist for up to 7 days after stopping treatment.

Side effects: contact dermatitis; systemic toxicity (dry mouth, bradycardia) may occur in the very young and the very old.

Dose: apply ointment 3 times daily at first in the affected eye; CHILD, apply ointment daily for 1 week before refraction.

Note: paralysis of accommodation accompanies cycloplegia.

**HOMATROPINE**

Eye drop, 2% (5ml) NRH/RRH

Therapeutic group: mydriatics.

Indications: anterior segment inflammation; refraction procedures in young children.

Contraindications: glaucoma.

Cautions: dilatation of the pupil may precipitate acute glaucoma, especially in the elderly.

Side effects: contact dermatitis.

Dose by ocular instillation: 1-2 drops every 10 minutes, repeated 4-5 times.

Counseling: do not drive or operate machinery for 1-2 hours after instilling in the eye.

Note: paralysis of accommodation will continue for up to 12 hours.

**TROPICAMIDE**

Eye drops, 1% (5ml) NRH/RRH

Therapeutic group: mydriatics and cycloplegics (antimuscarinics).

Indications: examination of fundus of the eye.

Contraindications: angle-closure glaucoma.

Caution: children and elderly (avoid 10% strength); cardiovascular disease (avoid or use 2.5% strength only); tachycardia; hyperthyroidism; diabetes.
Side effects transient stinging; raised intra-ocular pressure
Counseling patients should be warned not to drive for 1-2 hrs after mydriasis

**CYCLOPENTOLATE**

Eye drop, 0.5% (5ml)  
**Therapeutic group** mydriatic and cycloplegic (antimuscarinic)
**Indications** refraction procedures in young children; uveitis
**Contraindications** see under atropine
**Cautions** see under atropine
**Side effects** see under atropine

*Dose* by *ocular instillation, diagnostic procedures*: 1-2 drops repeated after every 5 to 15 minutes; *treatment of uveitis*: 1-2 drops up to four times daily

**TROPICAMIDE + PHENYLEPHRINE**

Eye drop, (0.8% + 5%) (5ml)  
**Indications** dilatation of the pupil to examine the fundus
**Contraindications** as under individual components
**Cautions** as under individual components
**Side effects** as under individual components

*Dose* by *ocular instillation*, 1 to 2 drops, 15-20 minutes before examination, to be repeated every 30 minutes, as required

23.5 Miscellaneous

**METHYLCELLULOSE**

Eye drops, 0.3% (5ml)  
**Therapeutic group** ocular lubricant
**Indications** dry, irritated eye
**Side effects** temporary blurred vision, minor burning/stinging/irritation

*Dose* by *ocular instillation*, 1-2 drops 3-4 hourly as required

**HYALURONIDASE**

Injection, 1500 iu/ml (1ml) inj  
**Therapeutic group** dispersion agent
**Indications** to enhance permeation of subcutaneous or IM injections, local anaesthetics and subcutaneous infusions; to promote resorption of excess fluids and blood
**Cautions** infants or elderly (control speed and total volume and avoid over hydration especially in renal impairment)
**Contraindications** do not apply direct to cornea; avoid infection or malignancy sites; not for anaesthesia in unexplained premature labour; not to be used to reduce swelling of bites or stings; not for IV administration
**Side effects** occasional severe allergy

*Dose* by *subcutaneous or IM injection*: 1500 units dissolved directly in solution to be injected (ensure compatibility); *by local anaesthetics*: 1500 units mixed with local anaesthetic solution (ophthalmology, 15 units/ml); *hypodermoclysis*: 1500 units dissolved in 1 ml water for injections or 0.9% sodium chloride
injection, administered before start of 500-1000 ml infusion fluid; **extravasation or haematoma**: 1500 units dissolved in 1 ml water for injections or 0.9% sodium chloride injection, infiltrated into affected area (as soon as possible after extravasation)

**SODIUM CROMOGLYCATE**

Eye drop, 4% (20mL)  
Therapeutic group mast cell stabilizers  
**Indications**  
allergic conjunctivitis  
**Contraindications** patients with known hypersensitivity to any of the ingredients in the formulation  
**Side effects** transient burning and stinging  
**Dose by ocular instillation**, 1 to 2 drops 4-6 times daily

**KETOROLAC**

Eye drop, 0.4% (5ml)  
Therapeutic group anti-inflammatory Agents  
**Indications** prophylaxis and reduction of inflammation and associated symptoms following ocular surgery and to relieve ocular itching associated with allergic conjunctivitis  
**Contraindications** known hypersensitivity to any of the ingredients in the formulation; pregnancy (third trimester)  
**Dose by ocular instillation**, 1 drop to the affected eye three to four times daily

24. Dermatological Medicines

24.1. Antifungal medicines (topical)

**CLOTIRMAZOLE**

Cream, 1% (15g)  
Therapeutic group antifungal medicines (topical)  
**Indications** susceptible fungal infections of skin and vagina  
**Cautions** contact with eyes and mucous membranes should be avoided  
**Side effects** occasionally, local irritation or mild inflammation  
**Dose by topical application**, applications 2-3 times daily  
**Counseling skin**: apply the ointment thinly as instructed; you should continue for 14 days after the skin has healed to be sure the infection does not come back  
**Note** tinea of nails and scalp usually needs systemic treatment

**WHITFIELD’S OINTMENT**

Ointment (extemp preparation)  
Therapeutic group antifungal preparation (topical)  
**Indications** mild superficial fungal infections particularly tinea pedis, tinea corporis and, occasionally tinea capitis  
**Side effects** localized mild inflammation  
**Dose**: by topical application, apply thin layer of ointment over infected areas twice daily for at least 4 weeks
24.2 Antibacterial medicines (topical)

NITROFURAZONE

Cream, 0.2% (500g)  NRH/RRH/DH/BHU

Therapeutic group  antibacterial (topical)

Indications  superficial skin infections; superficial burns

Contraindications  known hypersensitivity

Cautions  sensitization may occur if treatment exceeds 5 days

Dose  by topical application, 3-4 times daily after cleaning the affected area

Note  regular soap and water washing, followed by exposure or dry dressing, will usually be adequate treatment for superficial infections

SILVER SULPHADIAZINE

Cream, 1% (25g)  NRH/RRH/DH/BHU

Therapeutic group  antibacterial (topical)

Indications  skin infection, particularly gram-negative infection such as pseudomonal infection; in second and third degree burns; infected leg ulcers; pressure sores

Contraindications  sensitivity to sulphonamides, pregnancy and breastfeeding

Cautions  hepatic and renal impairment G-6-PD deficiency; pregnancy and breastfeeding (avoid in late pregnancy and in neonates)

Side effects  rarely allergic reactions including rashes, burning sensation, argyria reported following prolonged use

Counseling  in burns, apply with sterile applicator; in leg ulcers apply at least 3 times a week

24.3 Antiviral Medicines

ACYCLOVIR

Tablet, 400mg  NRH/RRH/DH

Therapeutic group  antiviral medicines (dermatological)

For details, refer antiviral, under section 6.5

24.4 Antiinflammatory and antipruritic medicines

CALAMINE

Ointment and lotion (extemp. preparation)  NRH/RRH/DH/BHU

Therapeutic group  antipruritic medicine

Indications  soothing and protecting the skin following minor skin irritations

Cautions  avoid getting this medication in the eyes, mouth, nose, and genital/anal areas; if you do get the medication in those areas, flush with plenty of water

Dose  by topical application, apply thinly 1-2 times daily

Counselling  apply the medication with a cotton pad, and allow the medication to dry on the skin

ZINC OXIDE

Ointment 15% (extemp. preparation)  NRH/RRH/DH/BHU

Therapeutic group  protectant
**Indications** minor skin irritations; diaper rash

**Cautions** do not use on deep or puncture wounds, cuts, or infections

**Dose by topical application**, apply thinly 1-2 times daily

**HYDROCORTISONE**

Cream, 1% (15g)

**Therapeutic group** anti-inflammatory and antipruritic medicines (mild corticosteroid)

**Indications** mild inflammatory skin disorders

**Contraindications** bacterial, fungal and viral skin infections

**Cautions** avoid large amounts or prolonged usage during pregnancy; particular care needs to be taken if used for napkin rash in infants

**Side effects** local: exacerbation of untreated infection, atrophy of skin structure, acne and papular dermatitis

**Dose by topical application**, apply thinly for 2-3 times daily, reducing the frequency as the condition improves

**Counseling** only use this cream according to the physician’s instructions; do not use it on any other person, or on a skin problem that has not been checked by a physician

**Note** hydrocortisone has the few side effects of all topical steroid preparations; only if the lesion is unresponsive patients should be advised to use a stronger preparation

**TRIAMCINOLONE ACETONIDE**

Cream, 0.1%, (15g)

**Therapeutic group** anti-inflammatory and antipruritic medicines (potent corticosteroid)

**Indications** inflammatory skin conditions unresponsive to hydrocortisone, especially lichen planus and discoid lupus erythematosus; psoriasis unresponsive to keratolytic agents

**Contraindications** known hypersensitivity; tuberculosis, fungal and viral skin lesions

**Cautions** avoid large amounts or prolonged usage during pregnancy; occlusive dressings increase the risk of systemic absorption; children and infants

**Side effects** local exacerbation of untreated infection, atrophy of skin structure, acne and papular dermatitis

**Dose by topical application**, apply thinly over the affected area 2-3 times daily, reducing the frequency as the condition improves.

**Counseling** only use this cream according to the physician’s instructions; do not use it on any other person, or on a skin problem without a physician’s order

**CLOBETASOL PROPIONATE**

Cream, 0.05% w/w (15g)

**Therapeutic group** anti-inflammatory and antipruritic medicines (very potent corticosteroid)
Indications short term treatment only of severe resistant inflammatory skin disorders such as recalcitrant eczemas unresponsive to less potent corticosteroids; psoriasis

Contraindications not recommended for children under 12 years; rosacea, acne vulgaris, perioral dermatitis, primary cutaneous viral infections, lesions infected with bacteria or fungi; hypersensitivity

Cautions not more than 50g of preparation should be applied per week; discontinue use if irritation occurs; pregnancy and lactation; avoid contact with eyes

Side effects use of large amounts of clobetasol propionate over prolonged periods can lead to systemic levels to produce adrenal suppression, Cushing’s syndrome, diabetes and hypertension

Dose by topical application, apply thinly over affected areas 1-2 times daily for up to 4 weeks

Counseling use this cream according to physician’s instructions; do not use it on any other person, or on a skin problem without a physician’s order

BETAMETHASONE VALERATE

Cream, 0.1% (15g) NRH

Therapeutic group anti-inflammatory and antipruritic medicines (potent corticosteroid)

Indications severe inflammatory skin disorders such as eczema unresponsive to less potent steroids; psoriasis

Contraindications untreated bacteria, fungi or viral skin infections, rosacea, acne vulgaris; infants under 1 year, and in general they should be avoided in children or if necessary use with great care and for short periods

Cautions avoid prolonged use in infants and children and on the face; do not use this medication near the eyes if you have glaucoma

Side effects may cause burning, stinging, itching or redness when first applied to the skin; exacerbation of untreated infection, thinning of skin, contact dermatitis

Dose by topical application, apply thinly over affected areas 1-2 times daily for 1-2 weeks only

Counseling clean and dry the affected area before applying the medication; to apply, gently massage a small amount of the medication into the affected area and surrounding skin; do not bandage, wrap or cover the area treated unless you are instructed to do so by your doctor

24.5 Keratoplastic and keratolytic agents

SALICYLIC ACID

Ointment, 40% (extemp. preparation) NRH/RRH/DH/BHU

Indications hyperkeratotic skin disorders; acne; warts and calluses; scalp conditions; fungal nail infections

Cautions significant peripheral neuropathy, patients with diabetes at risk of neuropathic ulcers; protect surrounding skin and avoid broken skin; not suitable for application to face, anogenital region, or large areas

Side effects sensitivity, excessive drying, irritation, systemic effects after widespread use
Dose advise patient to apply carefully to wart and to protect surrounding skin with soft paraffin; rub wart surface gently with file or pumice stone once weekly; treatment may need to be continued for up to 3 months

**COMPOUND PODOPHYLLINE**

Paint, 15% (extemp. preparation)  
**Dose** external genital warts: apply weekly in genitourinary clinic  
**Note** should be allowed to stay on the treated area for not longer than 6 hours and then washed off; care should be taken to avoid splashing the surrounding skin during application (which must be covered with soft paraffin as a protection); where there are a large number of warts only a few should be treated at any one time as severe toxicity can be caused by absorption

**COAL TAR AND SALICYLIC ACID**

Ointment, 9% (extemp. preparation)  
**Indications** psoriasis and occasionally chronic atopic eczema  
**Dose** by topical application, 1-2 times daily

24.6. Scabicides and pediculosides

**GAMMA BENZENE HEXACHLORIDE**

Lotion, 1% (100ml)  
**Therapeutic group** scabicides and pediculocides  
**Indications** scabies and pediculosis (crab-lice)  
**Contraindications** premature neonates, history of seizures, breast feeding and pregnancy  
**Cautions** avoid contact with eyes and mucous membranes; do not use more than twice for one course of treatment  
**Interactions** oils enhance absorption and therefore simultaneous application of creams, ointments and oils should be avoided  
**Side effects** eczematous eruptions, CNS toxicity, dizziness, convulsions, aplastic anaemia on prolonged use  
**Administration** scabies: apply thinly over whole body, omitting head and neck, wash off using cool water after 24 hours; repeat if necessary after 7 days; CHILD, leave for only 12 hours; lice: apply to dry hair, leave for 4 minutes, rinse, towel dry and comb

24.7 Local anaesthetics (topical)

**LIGNOCAINE**

Gel, 2% (30g)  
**Therapeutic group** local anaesthetic  
**Indications** surface anaesthesia of mucosa: pharynx, larynx, trachea and urethra  
**Contraindications** known or suspected hypersensitivity  
**Cautions** absorption from inflamed or highly vascular surfaces may cause systemic effects  
**Dose** respiratory tract: 1-5ml; rethral catheterisation: into urethra at least 5 minutes before catheter insertion; MEN 10ml followed by further 3-5 ml; WOMEN 3-5ml; CHILD 1-5ml
24.8 Rubefacients

**METHYLSALICYLATE**

Ointment (extemp. preparation)  
NRH/RRH/DH/BHU

Therapeutic group: rubefacients

**Indications**: counter-irritation for minor musculoskeletal injury

**Contraindications**: broken or inflamed skin, hypersensitivity

**Cautions**: careful exclusion of treatable underlying injury is important before this application is prescribed

**Side effects**: skin irritation may occur

**Administration**: rub in a little ointment and message the painful muscles 3 times daily; report to hospital again if there is no improvement after 1 week

24.9 Medicines for vitiligo

**METHOXSALEN**

Cream/Ointment, 1% w/v (25ml)  
NRH

Therapeutic group: medicines for vitiligo

**Indications**: vitiligo, psoriasis

**Contraindications**: known tendency to photosensitivity; lupus erythematosus; liver disease

**Cautions**: topical application can cause photosensitivity and other effects, and may predispose to malignancy

**Side effects**: contact dermatitis may occur

**Dose**: a 10-fold or 100-fold dilution should be considered at first; apply to the skin at the rate of 8-32 mcg/m²; expose to sunlight very briefly after 2 hours and gradually increase duration of exposure

**Note**: guttate and plaque-like psoriasis is more responsive than the exfoliative type of psoriasis

24.10 Miscellaneous

**WATER BASED GEL**

Water miscible lubricant jelly, (82g)  
NRH/RRH/DH/BHU

**Indications**: lubrication for digital or instrumental examination

**Contraindications**: hypersensitivity

**Cautions**: an antiseptic lubricant like dichloroxzylenol obstetric cream is to be preferred in labour; for male catheterisation, lignocaine gel should be used

**GLYCERINE**

Solution, 450ml  
NRH/RRH/DH

**Dose**: mouthwash as 10% solution, or diluted further in water

25. Immunological and vaccines

25.1 Sera and immunoglobulin

**TETANUS IMMUNOGLOBULIN**

Injection, 1500IU  
NRH/RRH/DH

Therapeutic group: sera and immunoglobulin
Indications passive immunization against tetanus in high-risk cases

Contraindications known hypersensitivity to horse serum

Cautions anaphylaxis or lesser evidence of sensitivity may occur; adrenaline should always be available, possibly in association with corticosteroids and antihistamines

Side effects serum sickness, with fever, vomiting, diarrhoea, bronchospasm and urticaria may often occur 7-10 days after the injection

Dose prophylaxis: by IM injection, 1500 units; established tetanus: By IM or IV injection, at least 10,000 units in association with sedative and other medicines

HUMAN RABIES IMMUNOGLOBULIN (RIG)

Injection, 500IU NRH/RRH/DH

Therapeutic group sera and immunoglobulin

Indications passive immunization against rabies

Contraindications hypersensitivity to the serum of the animal from which the antitoxin is prepared (see label)

Cautions anaphylaxis or lesser evidence of sensitivity may occur

Side effects serum sickness, with fever, vomiting, diarrhoea, bronchospasm or urticaria may often occur 7-10 days after the injection

Dose 20IU/kg body weight (max 1500IU); HRIG should be infiltrated as much as possible in and around all wounds; after infiltration on the wounds if there are any remaining HRIG, it should be administered by IM injection on the anterolateral region or deltoid region (away from the site of vaccine administration). Anti-rabies vaccine should be administered preferably on the same day after the HRIG but at different sites

Note realistic risk assessment is important, as the antiserum carries its own risks; unpunctured (i.e. bruised only) skin does not constitute a risk of rabies; a dog behaving normally (including one that bites when provoked or when guarding its territory) is unlikely to be rabid; any dog alive 10 days after the bite is also not rabid; wash wound with soap and water followed by generous application of spirit despite the pain will itself greatly reduces the risk of rabies

ANTI-SNAKE VENOM SERUM

Injection, powder for reconstitution 10g NRH/RRH/DH/BHU

Therapeutic group sera and immunoglobulin

Indications treatment of bite from viper, cobra and krait

Contraindications known hypersensitivity to antiserum, unless the danger to life outweighs the risk; bite by non-poisonous snake, or when puncture marks are not seen

Cautions history of previous serum injections (including antitetanus, antidiphtheria); history of allergy, asthma or eczema. Test dose of 0.1ml serum in 0.9ml normal saline to be injected SC and patient observed for 30 minutes

Side effects local flare or general anaphylactic reaction may be seen after the test dose or during the full dose; pallor, sweating, nausea, vomiting, urticaria and hypotension are the features of anaphylaxis.

Dose by IV injection, 10ml immediately; a further 10-20ml may be given after 2 hours or less, then repeated 6-hourly as required
Note all injections should be given very slowly, never more than 1ml per minute, and preferably diluted in 100ml 9% sodium chloride and given as a slow IV infusion.

25.2 Vaccines

25.2.1 For universal immunization

**BCG**

Injection, (20 doses) NRH/RRH/DH/BHU

*Therapeutic group* vaccines (universal)

*Indications* routine prevention of tuberculosis and leprosy

*Contraindications* known HIV infection

*Cautions* correct intradermal technique is needed to reduce the risk of ulceration or abscess formation; use a fresh needle and syringe for every child, and discard the vial at the end of the session

*Side effects* a papule or small ulcer appears within 6 weeks, and normally heals within 6 weeks

*Dose* see appendix 3 under immunization schedule

**TETANUS DIPHTHERIA (TD)**

Injection, 0.5ml NRH/RRH/DH/BHU

*Therapeutic group* vaccines (universal)

*Indication*: prevention of tetanus and diphtheria

*Cautions* acute febrile illness, but mild illness is not a reason for delaying vaccination

*Side effects* redness or swelling where the shot was given; mild fever; headache

*Dose* see appendix 3 under immunization schedule

**MUMPS MEASLES RUBELLA VACCINE**

Injection, powder for reconstitution, NRH/RRH/DH/BHU

*Therapeutic group* vaccines (universal)

*Indications* routine prevention of measles, mumps and rubella

*Contraindications* allergy to eggs; immune deficiency disorders

*Cautions* acute febrile illness; mild febrile illness, malnutrition and diarrhoea are no reason for delaying vaccination; use a fresh needle and syringe for every child, and discard the vial at the end of the session

*Side effects* a mild measles like rash and fever may occur about 1 week after the injection; convulsions and encephalitis are rare complications

*Dose* see appendix 3 under immunization schedule

**POLIOMYELITIS**

Oral drops, (10 doses) NRH/RRH/DH/BHU

*Therapeutic group* vaccines (universal)

*Indications* routine prevention of polio types 1, 2 and 3

*Contraindications* vomiting, serious diarrhoea, immunodeficiency disorders
Cautions  live vaccine excreted in stool, protect immuno-compromised or non-immunized household contacts; in mild diarrhoea, consider extending course to 4 doses; discard the opened container at the end of the session

Dose: see appendix 3 under immunization schedule

**DTP- Hep B- Hib (Pentavalent)**

Injection (0.5ml)  
NRH/RRH/DH/BHU

**Therapeutic group** vaccine (universal)

**Indications** active immunization against diphtheria, tetanus, pertussis, hepatitis B and haemophilus influenza B

**Contraindications** known hypersensitivity to any component of the vaccine, or a severe reaction to a previous dose of the combination vaccine or any of its constituents is an absolute contraindication to subsequent doses of the combination vaccine or the specific vaccine known to have provoked an adverse reaction

**Caution** careful injection technique will reduce the risk of thigh abscess; use a fresh needle and syringe for every child, and discard the vial at the end of the session

**Side effects** mild local or systemic reactions are common, temporary swelling, tenderness and redness at the site of injection; fever, vomiting, diarrhoea

**Dose** see appendix 3 under immunization schedule

25.2.2 For specific group of individuals

**PURIFIED VERO-CELL RABIES VACCINE (PVRV)**

Injection (0.5 ml)  
NRH/RRH/DH/BHU

**Therapeutic group** vaccines (specific)

**Indications** pre and post-exposure active immunization against rabies

**Contraindications** known hypersensitivity to the components of the vaccine

**Side effects** local and systemic symptoms are less frequent; neurological complications do not seem to occur

**Dose** by intradermal injection, one dose each (0.1 ml) at two sites on both arms (over deltoid) on D0, D3, D7, and D28

**Counseling** patients must be advised not to rub the site of injection after administration of vaccine

**Note** realistic risk assessment is important; un-punctured (i.e. bruised only) skin does not constitute a risk of rabies; a dog behaving normally (including one that bites when provoked or when guarding its territory) is unlikely to be rabid; any dog alive 10 days after the bite is also not rabid; locally wash the wound thoroughly with soap and water followed by generous application of spirit despite the pain, will itself greatly reduce the risk of rabies

**HEPATITIS B VACCINE (rDNA)**

Injection (10ml)  
NRH/RRH/DH

**Therapeutic group** vaccine (specific)

**Indications** active immunization against hepatitis B virus infection

**Contraindications** known hypersensitivity to the components of the vaccine; severe febrile infections

**Caution** should not be administered in the gluteal region or intradermally
Side effects mild local or systemic reactions are common, temporary swelling, tenderness and redness at the site of injection; fever, vomiting, diarrhoea

Dose by IM injection in to deltoid muscle, ADULT, 3 doses of 1ml (20mcg) at an interval of 0,1,6; CHILD, 3 doses of 0.5ml (20mcg) at an interval of 0, 1, 6; chronic hemodialysis patients: 4 doses of 2ml (40mcg), at an interval of 0, 1, 2, 6

Note the vaccine is used in individuals at high risk of contracting hepatitis B. High-risk groups include:

- parenteral medicine misusers, their sexual partners, and household contacts; other medicine misusers who are likely to ‘progress’ to injecting;
- individuals who change sexual partners frequently;
- close family contacts of a case or individual with chronic hepatitis B infection;
- babies whose mothers have had acute hepatitis B during pregnancy or are positive for hepatitis B surface antigen (regardless of e-antigen markers);
- babies whose mothers are positive for hepatitis B surface antigen and for e-antigen antibody
- individuals with haemophilia, those receiving regular blood transfusions or blood products, and carers responsible for the administration of such products;
- patients with chronic renal failure including those on hemodialysis and home carers of dialysis patients;
- individuals with chronic liver disease;
- healthcare personnel (including trainees) who have direct contact with blood or blood-stained body fluids or with patients’ tissues;
- laboratory staff who handle material that may contain the virus;
- other occupational risk groups such as morticians and embalmers;
- staff and patients of day-care or residential accommodation for those with severe learning difficulties;
- staff and inmates of custodial institutions;
- those travelling to areas of high or intermediate prevalence who are at increased risk or who plan to remain there for lengthy periods;
- families adopting children from countries with a high or intermediate prevalence of hepatitis B;
- foster carers and their families.

Immunization takes up to 6 months to confer adequate protection; the duration of immunity is not known precisely, but a single booster 5 years after the primary course may be sufficient to maintain immunity for those who continue to be at risk

26. Vitamins & Minerals

26.1 Vitamins

**VITAMIN B COMPLEX**

Injection, 250mg/ml (10ml)  NRH/RRH/DH
Tablet, 32.5mg  NRH/RRH/DH/BHU

Therapeutic group vitamins and minerals
Indications prophylaxis of vitamin B deficiency viz beri-beri, riboflavin deficiency, pellagra and other vitamin B deficiency states; alcoholic vitamin deficiency states

Contraindications injection: known hypersensitivity to parenteral thiamine, vitamin B complex or multivitamin injection

Cautions injection may occasionally cause anaphylaxis; thiamine deficiency should be treated with thiamine; vitamin B complex does not include pyridoxine, which should be prescribed specifically if indicated

Side effects occasional rashes and allergic reactions

Dose by oral administration, ADULT, 1 tablet every 12 hours; CHILD 5-14 years, adult dose; CHILD 2-4 years, 1 tablet daily; By IM injection, ADULT: 2ml daily

VITAMIN C

Tablet, 250mg NRH/RRH/DH/BHU

Therapeutic group vitamins and minerals

Indications scurvy; prevention of vitamin C deficiency, especially in the elderly

Dose by oral administration, prophylactic: 25-75mg daily; therapeutic: at least 250mg daily in divided doses

RETINOL (Vitamin A)

Capsule, 200,000 units NRH/RRH/DH/BHU

Therapeutic group vitamins and minerals

Indications prophylaxis and treatment of vitamin A deficiency

Contraindications repeated treatment; pregnancy - high doses may lead to birth defects

Cautions toxicity with repeated doses

Side effects rough skin, dry hair, enlarged liver and raised ESR may occur with over dosage

Dose by oral administration, prophylaxis: CHILD over 1 year, and ADULT, 1 capsule every 6 months; CHILD under 1 year, 3 drops every 6 months; night blindness, established vitamin A deficiency, malnutrition grade II and III: CHILD over 1 year, and ADULT, 1 capsule on day 1, 2 and 14; CHILD under 1 year, 3 drops day 1,2 and 14; all ages: repeat only after 6 months; breastfeeding: 1 capsule only at delivery or during early lactation

Note this treatment should always be recorded in the growth chart and MCH card so that extra doses are not given

PYRIDOXINE (Vitamin B6)

Tablet, 25mg NRH/RRH/DH

Therapeutic group vitamins and minerals

Indications prophylaxis and treatment of pyridoxine deficiency, including isoniazid neuropathy

Side effects none at normal doses; toxicity in excessive dosage is said to occur

Dose by oral administration, Isoniazid induced neuropathy (prophylaxis): 10mg daily; (treatment): 50mg 3 times daily

THIAMINE (Vitamin B1)

Injection, 100mg/ml (1ml) NRH/RRH/DH

Therapeutic group vitamins and minerals

Indications prophylaxis of vitamin B deficiency viz beri-beri, riboflavin deficiency, pellagra and other vitamin B deficiency states; alcoholic vitamin deficiency states
Tablet, 75mg  
NRH/RRH/DH/BHU

**Therapeutic group** vitamins and minerals  
**Indications** treatment and prevention of thiamine deficiency, beri-beri (wet or dry), Wernicke’s encephalopathy  
**Contraindications** known hypersensitivity to parenteral thiamine, vitamin B Complex, or multivitamin injection  
**Cautions** anaphylactic shock may occasionally follow  
**Dose** severe deficiency: by IM injection, 200-300mg daily; mild chronic deficiency: by oral administration, 10-25mg daily; prophylactic in alcoholic patient: by oral administration, 10-25 mg daily

### MULTIVITAMIN

Injection, (10ml)  
NRH/RRH

**Therapeutic group** vitamin and minerals  
**Indications** treatment of Wernicke’s encephalopathy and Korsakoffs psychosis in alcoholic and malnourished patients  
**Contraindications** known hypersensitivity to parenteral thiamine, vitamin B complex, or multivitamin injection  
**Cautions** anaphylaxis may occur; facilities for treatment must be available during and shortly after administration.  
**Dose** by slow IV injection or by IV infusion 10ml every 4-8 hours for up to 2 days

### 26.2 Minerals

**CALCIUM LACTATE**

Injection 10% (10ml)  
NRH/RRH/DH

Tablet, 300mg  
NRH/RRH/DH/BHU

**Therapeutic group** vitamins and minerals  
**Indications** calcium deficiency, especially in childhood, pregnancy and lactation, osteoporosis and tetany  
**Contraindications** conditions associated with hypercalcaemia and hypercalciuria  
**Interactions** see appendix 1 under calcium salts  
**Side effects** (after IV injection): bradycardia, arrhythmia and local irritation  
**Dose** prophylaxis: by oral administration, 1-2 tablets 3 times daily; osteoporosis: by oral administration, 5 tablets 4 times daily; hypocalcaemic tetany: by slow IV injection, 10ml followed by 40ml daily as an IV infusion  
**Note** alkalotic tetany due to hyperventilation can be reversed by a stat dose of 10ml IV; however, rebreathing from a paper bag is usually safe and effective

**ZINC SULPHATE**

Tablet, 20mg (elemental zinc)  
NRH/RRH/DH/BHU

**Therapeutic group** vitamins and minerals  
**Indications** zinc deficiency or supplementation in zinc losing conditions; diarrhoea  
**Contraindications** hypersensitivity  
**Interactions** see appendix 1 under zinc
Side effects  abdominal pain, dyspepsia, nausea, vomiting, diarrhoea, gastric irritation, gastritis; irritability, headache, lethargy

Dose by oral administration, ADULT and CHILD over 30Kg, 1 tablet in water 1-3 times daily after food; CHILD less than 10Kg, ½ tablet daily; CHILD 10-30 Kg, ½ tablet 1-3 times; diarrhoea CHILD less than 6 months, 10mg/day; CHILD 6 months-5 years, 20mg/day

**CALCIUM CARBONATE + VITAMIN D₃**

Tablet, (500mg + 250IU) NRH/RRH

Therapeutic group  vitamins and minerals

Indications  management of combined calcium and vitamin D deficiency including chronic kidney disease and hyperparathyroidism

Side effects  constipation, flatulence, nausea, abdominal pain and diarrhoea

Dose by oral administration, 1 tablet twice or thrice daily

Counseling  take the medicine after meals

27. Solution for water, electrolytes & acid-base disturbances

27.1. Oral

**POTASSIUM CHLORIDE**

Injection, 15% (10ml) NRH/RRH/DH

Oral Solution 10% (extemp. preparartion) NRH/RRH/DH/BHU

Therapeutic group  solutions for water, electrolyte and acid-base disturbances

Indications  potassium depletion; potassium solution given to correct hypokalaemia caused by diuretics

Contraindications  severe renal impairment, raised plasma potassium levels, untreated Addison’s disease

Cautions oral potential scarring/stricture of GI tract; IV: mix solution thoroughly after adding to infusion bottle to avoid “layering”

Interactions  see appendix 1 under potassium salts

Side effects  oral: nausea and vomiting; occasional small bowel ulceration; IV: rapid infusion may cause cardiac asystole

Dose by oral administration, 30ml daily; by IV infusion, 1 ampoule in 500ml dextrose or 0.9% sodium chloride infusion, given over 3-4 hours

**CALCIUM POLYSTYRENE SULFONATE**

Oral powder, 15g NRH/RRH

Therapeutic group  potassium binder (ion exchange resin)

Indication  hyperkalaemia

Contraindications  obstructive bowel disease; hypokalaemia

Cautions  children (impaction of resin with excessive dosage or inadequate dilution); pregnancy and breast feeding

Interactions  see appendix 1

Side effects  GI disturbance, constipation; hypokalemia, hypocalcaemia, hypomagnesemia; nausea, vomiting; GI tract ulceration or necrosis which could lead to perforation
Dose by oral administration, ADULT, 4 times daily in water (not in fruit squash which has high potassium content); CHILD, 0.5g to 1g/kg daily in 3-4 divided dose

Counseling reconstitute powered resin as suspension in water or syrup; for each 1g of powered resin add 3-4 ml of water or syrup; do not refrigerate

27.2 Parenteral

**COMPOUND SOLUTION OF SODIUM LACTATE**

Injection (500ml) NRH/RRH/DH/BHU

Therapeutic group solutions correcting water, electrolyte and acid-base disturbances

Indications pre-and perioperative fluid and electrolyte replacement; hypovolaemic shock

Contraindications metabolic or respiratory alkalosis; hypocalcaemia or hypochlorhydria

Cautions restrict intake in impaired renal function, cardiac failure, hypertension, peripheral and pulmonary oedema, and toxemia during pregnancy

Side effects excessive administration may cause metabolic alkalosis; administration of large doses may give rise to oedema

Dose by IV infusion, CHILD under 1 year, 30ml/kg in one hour, repeated once if pulse still very weak or undetectable, then 70ml/kg in 5 hours; CHILD over 1 year, 30ml/Kg in 30 minutes, repeated once if pulse still very weak or undetectable, then 70ml/kg in 2½ hours; re-assess the patient after completion of IV regime; any child able to drink should have ORS 5ml/Kg/hour as well during the infusion

**DEXTROSE**

Injection, 5% (500ml) NRH/NRH/DH/BHU
Injection, 10% (500ml) NRH/NRH/DH/BHU
Injection, 25% (100ml) NRH/NRH/DH/BHU

Therapeutic group solutions for water, electrolyte and acid-base disturbances

Indications 5% inj: rehydration in diarrhoea, trauma and post-operatively; 10% inj: post-operative rehydration when additional energy is required; 25%: correction of hypoglycaemia

Cautions 5% and 10% inj: monitor for signs of vascular overload; unduly rapid replacement may lead to pulmonary oedema; sodium depletion may occur due to dilution; 10% inj: thrombophlebitis may occur at the infusion site

Dose by IV infusion, ADULT, 2-3 litres per day or as required

**DEXTROSE + SODIUM CHLORIDE**

Injection, (5%+0.9%) NRH/RRH/DH
Injection, (5%+0.45%) NRH/RRH

Therapeutic group solutions for water, electrolyte and acid-base disturbances

Indications pre-operative and post-operative fluid replacement

Cautions monitor for signs of vascular overload; unduly rapid replacement may lead to pulmonary oedema; restrict intake in impaired renal function, cardiac failure, hypertension, peripheral and pulmonary oedema
Side effects administration of large doses may give rise to sodium accumulation and oedema

**Dose by IV infusion**, typical rate during surgery, 5ml/kg/hour

**SODIUM BICARBONATE**

| Formulation | Concentration | Therapeutic group | Indications | Cautions | Dose by oral administration, 1 to 2 tablets 2-3 times daily; by slow IV injection, 10ml. Note metabolic acidosis due to early renal failure or diabetic ketoacidosis is usually accompanied by hyponatremia; it is best to correct this by infusion of sodium chloride 0.9% injection, which may restore the kidney’s own ability to generate bicarbonate.

**SODIUM CHLORIDE**

| Formulation | Concentration | Therapeutic group | Indications | Cautions | Dose by IV infusion, 1-2 litres/day

**MULTI-ELECTROLYTE (N5-PD-Lyte)**

| Formulation | Therapeutic group | Indications | Dose by IV infusion, 1-2 litres/day

**AMINO ACID SOLUTION**

| Formulation | Therapeutic group | Indications | Contraindications severe hepatic impairment | Cautions fluid overload may occur, especially when given simultaneously with another infusion; scrupulous care in sterilizing equipment and establishing the
venous line should be taken, as bacterial overgrowth may readily occur in amino acid solutions; adequate simultaneous dextrose infusion must be given to allow maximal utilization of amino acids by the body

Dose by IV infusion, ADULT, 200-800ml per day at 40-50 drops/minute; CHILD, 20-40ml/Kg per day

29. Diagnostic agents

29.1 Ophthalmic medicines

FLUORESCIN

Strips, 4% (100strips/pkt) NRH/RRH/DH

Therapeutic group diagnostic agents (ophthalmic)

Indications examination of the cornea for lesions of foreign bodies

Cautions maintain sterility of tip when opening and using this agent; avoid touching the cornea with the tip of the strip

Use moisten the strip in sterile water or in tear fluid, and gently wipe it on the inner aspect of the lower lid; gross lesions will show up with white light, but blue light evokes fluorescence and a better view

29.2 Radio-contrast Media

IOHEXOL

Injection, 300mg (50ml) NRH
Injection, 300mg (10ml) NRH/RRH
Injection, 350mg (100ml) NRH

Therapeutic group radio-contrast media

Indications myelography, urography, arthrography and for visualization of GI tract and body cavities

Contraindications hypersensitivity to iodine containing compounds

Cautions pregnancy and lactation; history of allergy, severe hepatic and renal impairment, dehydration (correct fluid and electrolyte balance before administration)

Side effects nausea, vomiting, metallic taste, flushing, sensation of heat, weakness, headache, coughing, rhinitis etc

Dose route and dose depends on the procedure; administered only by radiologist

BARIUM SULPHATE

Oral suspension, 95% w/v NRH/RRH/DH

Therapeutic group radio-contrast media

Indications radiography of GI tract

Contraindications intestinal obstruction, intestinal perforation or conditions with risk of perforation

Cautions pre-existing heart disease; ulcerative colitis; adequate hydration must be ensured after the procedure to prevent severe constipation

Side effects constipation or diarrhoea, abdominal cramps; ECG changes and occasional dysrhythmias

Dose as a suspension or paste by mouth or by enema
SODIUM AMADOTRIAZOATE + MEGLUMIN AMODOTRIAZOATE

Solutions, 10:60 (150ml)  
NRH

Therapeutic group  radio-contrast media

Indications  urography, venography, operative cholangiography, splenoportography, arthrography, discography; computer assisted axial tomography

Contraindications  hypersensitivity to iodine-containing compounds

Cautions  history of allergy, atopy or asthma; severe hepatic impairment; renal impairment; dehydration (correct fluid and electrolyte balance before administration); multiple myeloma (risk if dehydrated, may precipitate fatal renal failure); cardiac disease, hypertension, phaeochromocytoma, sickle cell disease, hyperthyroidism, elderly, debilitated or children (increased risk of adverse effects); pregnancy; breastfeeding; may interfere with thyroid function tests; biguanides (withdraw 48 hours before administration; restart when renal function stabilized)

Side effects  nausea, vomiting, diarrhoea, metallic taste, flushing, sensations of heat, weakness, dizziness, headache, coughing, rhinitis, sweating, sneezing, lacrimation, visual disturbances, pruritus, salivary gland enlargement, pallor, cardiac disorders, hemodynamic disturbances and hypotension; disseminated intravascular coagulation; fibrinolysis and depression of blood coagulation factors

Dose  diagnostic radiography, ADULT and CHILD, route and dosage depend on procedure and preparation used (consult manufacturer’s literature)

Note  administration, only by radiologists, according to manufacturer’s literature
Appendix 1: Interactions

Pharmacodynamic interactions: These are interactions between medicines, which have similar or antagonistic (opposite) pharmacological effects or side effects. This may be due to competition at the receptor sites, or occur at between medicines acting on the same physiological system.

Pharmacokinetic interactions: These occur when one medicine alters the absorption, distribution, metabolism or excretion of another, thus increasing or reducing the amount of medicine available to produce its pharmacological effect.

List of medicine interactions

ACE inhibitors and angiotensin II antagonists
- Includes enalapril and losartan
- Anesthetics: enhanced hypotensive effect
- Analgesics: antagonism of hypotensive effect & increased risk of renal impairment with NSAIDs
- Cyclosporin: increased risk of hyperkalemia
- Diuretics: enhanced hypotensive effect; risk of severe hyperkalemia with potassium sparing diuretics
- Potassium salts: increased risk of hyperkalemia

Acyclovir
- Risk of renal impairment increased by other nephrotoxic medicines

Adenosine
- Local anesthetics: increase myocardial depression when antiarrhythmic given with bupivacaine
- Antiarrhythmic: increase myocardial depression when anti arrhythmic given with another anti arrhythmic
- Antipsychotics: increase risk of ventricular arrhythmias when anti arrhythmic that prolong QT interval given with antipsychotic that prolong QT interval
- Beta blockers: increase myocardial depression when anti arrhythmic given with beta-blockers
- Theophylline: antiarrhythmic effect of adenosine antagonist by theophylline

Albendazole
- Serum level is increased with dexamethasone

Allopurinol
- Antibacterial: increased risk of rash with concomitant ampicillin and amoxicillin
- Anticoagulants: effects of warfarin and acenocoumarol possibly enhanced
- Cyclosporin: plasma concentration of cyclosporin increased (risk of nephrotoxicity)
- Theophylline: plasma-theophylline concentration possibly increased

Alpha-blockers
- Includes tamsulosin
- Anesthetics: enhanced hypotensive effect
- Analgesics: NSAIDs antagonize hypotensive effect
- Beta-blockers: enhanced hypotensive effect
- Calcium channel blockers: enhanced hypotensive effect
- Diuretics: enhanced hypotensive effect
- Dopaminergics: levodopa enhances hypotensive effect

### Aminoglycosides
- Cyclosporin: increased risk of nephrotoxicity
- Cytotoxics: increased risk of nephrotoxicity and possibly of ototoxicity with cisplatin
- Diuretics: increased risk of ototoxicity with loop diuretics

### Amiodarone

**Note:** *amiodarone has a long half-life; there is potential for medicine interactions to occur for several weeks after treatment has been stopped*
- Antibacterials: increased risk of ventricular arrhythmias with erythromycin (parenteral) and cotrimoxazole
- Anticoagulants: metabolism of warfarin inhibited (enhanced effect)
- Antidepressants: increased risk of ventricular arrhythmias with tricyclic antidepressants
- Antiepileptics: metabolism of phenytoin inhibited
- Antimalarials: increased risk of ventricular arrhythmias with chloroquine and quinine; avoid concomitant use with coartem®
- Antipsychotics: increased risk of ventricular arrhythmias with phenothiazines (e.g. chlorpromazine) and haloperidol
- Beta-blockers: increased risk of bradycardia, AV block and myocardial depression
- Calcium channel blockers: increased risk of bradycardia, AV block and myocardial depression with verapamil
- Cardiac glycosides: increased plasma concentration of digoxin (half digoxin maintenance dose)
- Diuretics: cardiac toxicity increased if hypokalaemia occurs with acetazolamide, loop diuretics and thiazides

### Anaesthetics (general)
- ACE inhibitors and angiotensin II antagonists: enhanced hypotensive effect
- Antihypertensives: enhanced hypotensive effect
- Antipsychotics: enhanced hypotensive effect
- Beta-blockers: enhanced hypotensive effect
- Calcium channel blockers: enhanced hypotensive effect and AV delay with verapamil
- Cytotoxic: antifolate effect of methotrexate increased by N20
- Dopaminergics: risk of arrhythmias if a volatile liquid anaesthetic such as halothane is given with levodopa
- Sympathomimetics: risk of arrhythmias if adrenaline given with volatile liquid anaesthetics such as halothane

### Antacids

**Note:** *antacids should preferably not be taken at the same time as other medicines since they may impair absorption*
Antibacterials: reduced absorption of ciprofloxacin, isoniazid, norfloxacin, ofloxacin, rifampicin and most tetracyclines
Iron: magnesium trisilicate reduces absorption of iron

Anticholinesterase
- Includes neostigmine
- Antibacterials: aminoglycosides antagonize the effect of neostigmine

Antidepressants-SSRIs
- Includes fluoxetine
- Analgesics: risk of CNS toxicity increased with tramadol; increased risk of bleeding with aspirin and NSAIDs
- Anticoagulants: effect of warfarin enhanced
- Antiepileptics: plasma concentration of carbamazepine and phenytoin increased by fluoxetine
- Antimalarials: avoid concomitant use with coartem®
- Antipsychotics: plasma concentration of risperidone and haloperidol increased by fluoxetine
- Dopaminergics: hypertension and CNS excitation with fluoxetine

Antidepressants-tricyclic
- Includes amitriptyline
- Alcohol: enhanced sedative effect
- Analgesics: risk of CNS toxicity with tramadol; possibly increased sedation with opioid analgesics
- Antiarrhythmics: increased risk of ventricular arrhythmias with medicines which prolong QT interval including amiodarone
- Antiepileptics: antagonism (convulsive threshold reduced)
- Antihypertensive: enhanced hypotensive effect
- Antimalarials: avoid concomitant use with coartem®
- Sympathomimetics: hypertension and arrhythmias with adrenaline

Antidiabetics
- Includes insulin, metformin, pioglitazone
- Ant diabetic action of sulfonylureas is enhanced by phenylbutazone, sulfonamides, chloramphenicol, warfarin, lithium and theophylline
- Antidiabetic action of sulfonylurea is decreased by phenobarbitone, phenytoin, rifampicin, oral contraceptives and corticosteroids
- ACE inhibitors: action of metformin is enhanced
- Alcohol: Lactic acidosis may occur when metformin is taken with alcohol
- Glycemic control of metformin may be affected by phenothiazines, diuretics and corticosteroids

Antifungals
- Antibacterials: rifampicin accelerates metabolism of ketoconazole
- Anticoagulants: effect of warfarin enhanced
- Antiepileptics: plasma concentration of ketoconazole reduced by phenytoin
- Antimalarials: avoid concomitant use with coartem®
Cyclosporin: metabolism inhibited by ketoconazole
Theophylline: plasma concentration increased by ketoconazole

**Antihistamines (H1 antagonists)**
- Includes chlorpheniramine, ceterizine
- Anticholinergics: potentiates properties such as dryness of mouth with anticholinergic medicines such as dicyclomine
- Potentiates CNS depression with alcohol, benzodiazepines, antidepressants and opioid analgesics

**Antimuscarinics**
- Includes atropine, and dicyclomine
- Many medicines have antimuscarinics side effects like dry mouth, urine retention and constipation
- Antidepressants: increased antimuscarinic side effects
- Antihistamines: increased antimuscarinic side effects
- Nitrates: reduced effect of sublingual nitrates (failure to dissolve under tongue due to dry mouth)

**Antipsychotics**
- Includes haloperidol, chlorpromazine, fluphenazine, risperidone, olanzapine
- Analgesics: enhanced sedative and hypotensive effect if given with opioid analgesics; severe drowsiness possible if indomethacin given with haloperidol
- Antidepressants: fluoxetine increases the plasma concentration of risperidone and haloperidol
- Antiepileptics: carbamazepine accelerates metabolism of haloperidol, olanzapine and risperidone; phenobarbital accelerates the metabolism of haloperidol; increased risk of neutropenia if olanzapine given with valproate
- Beta-blockers: concomitant administration of propranolol and chlorpromazine may increase plasma concentration of both medicines

**Antiretrovirals**
- Includes lamivudine, stavudine, nevirapine, efavirenz, zidovudine, and lopinavir
- Avoid concomitant use of zidovudine with stavudine
- Efavirenz and Nevirapine possibly reduce plasma concentration of lopinavir
- Plasma concentration of efavirenz and lopinavir reduced by nevirapine
- Antibacterials: plasma concentration of nevirapine and lopinavir reduced by rifampicin
- Anticoagulants: nevirapine may enhance or reduce anti-coagulant effect of warfarin
- Antiepileptics: plasma concentration reduced by carbamazepine and phenytoin
- Antifungals: nevirapine reduces plasma concentration of ketoconazole
- Barbiturates: plasma concentration of lopinavir reduced by barbiturates
- Estrogens: nevirapine accelerates metabolism of estrogens
- Progestogens: nevirapine accelerates metabolism of progestogens
Anxiolytics and Hypnotics
- Includes diazepam, lorazepam, midazolam
- Antibacterials: isoniazid inhibits metabolism of diazepam; rifampicin increases metabolism of diazepam and possibly other benzodiazepines

Antiemetic + Lumefantrine (Coartem®)
- Antiarrhythmics: avoid concomitant administration with amiodarone
- Antibacterials: avoid concomitant use with quinolones and macrolides
- Antidepressants: avoid concomitant use
- Antifungals: avoid concomitant use with imidazoles
- Antipsychotics: avoid concomitant use

Aspirin
- Other analgesics: avoid concomitant use with other NSAIDs (increased side effects); cardio protective effect of aspirin possibly reduced by ibuprofen
- Anticoagulants: increased risk of bleeding due to anti-platelet effect of aspirin
- Cytotoxics: reduced excretion of methotrexate (increased toxicity)

Barbiturates
- Antibacterials: metabolism of chloramphenicol, metronidazole and doxycycline increased
- Anticoagulants: metabolism of warfarin accelerated
- Antidepressants: antagonism of anticonvulsant effect
- Antifungals: reduces absorption of griseofulvin
- Antipsychotics: antagonism of anticonvulsant effect; phenobarbitone accelerates metabolism of haloperidol
- Calcium channel blockers: effect of nifedipine and verapamil reduced
- Cyclosporin: metabolism of cyclosporin accelerated
- Corticosteroids: metabolism of corticosteroids accelerated
- Estrogens: metabolism of oral contraceptives accelerated

Betablockers
- Includes atenolol, propranolol, carvedilol, metoprolol, timolol
- Note: since systemic absorption may follow after topical application to eye, the possibility of interaction especially with verapamil should be borne in mind
- Anaesthetics: enhanced hypotensive effect; increased risk of bupivacaine toxicity with propranolol
- Analgesics: NSAIDs antagonize hypotensive effect
- Antiarrhythmics: increased risk of myocardial depression and bradycardia; increased risk of myocardial depression and AV block with amiodarone; increased risk of lignocaine toxicity with propranolol
- Antibacterials: rifampicin accelerates metabolism of propranolol
- Antihypertensive: increased hypotensive effect; increased risk of first dose hypotensive effect with post-synaptic alpha-blockers such as prazosin
- Antipsychotics: concomitant administration of propranolol and chlorpromazine may increase concentration of both medicines
- Calcium channel blockers: severe hypotension and heart failure occasionally with nifedipine
- Sympathomimetics: severe hypertension with Adrenaline and possibly with dobutamine

**Betahistine**
- Antihistamines: effect theoretically antagonized by anti-histamines

**Bupivacaine**
- Antiarrhythmics: increased myocardial depression
- Betablockers: increased risk of bupivacaine toxicity with propranolol

**Calcium polystyrene sulfate**
- Thyroid hormones: calcium polystyrene sulfate reduces absorption of levothyroxin

**Cefixime**
- Anticoagulants: cephalosporins possibly enhance anticoagulant effects of coumarins
- Oestrogen: antibacterial that do not induce liver enzymes reduce contraceptives of oestrogen
- Probenecid: excretion of cephalosporin reduced by probenecid

**Calcium salts**
- Reduced absorption of ciprofloxacin and tetracyclines

**Calcium channel blockers**
- Includes verapamil, amlodipine and nifedipine
- Anaesthetics: verapamil increases hypotensive effect of GA and risk of AV delay
- Antiarrhythmics: amiodarone induced risk of bradycardia, AV block and myocardial depression
- Antibacterials: rifampicin increases metabolism of nifedipine and verapamil
- Antiepileptics: effect of carbamazepine enhanced by verapamil; effect of nifedipine reduced by carbamazepine, phenobarbitone and phenytoin
- Antifungals: possibly increased ionotropic effect with ketoconazole
- Antihypertensive: enhanced hypotensive effect
- Beta-blockers: occasionally severe hypertension and heart failure with nifedipine
- Cardiac glycosides: plasma concentration of digoxin increased by verapamil and possibly nifedipine; increased AV block and bradycardia with verapamil
- Cyclosporin: plasma concentration increased by verapamil
- Magnesium salts: profound hypotension reported with nifedipine and IV MgSO4 in pre-eclampsia
- Theophylline: plasma concentration increased by verapamil

**Carbamazepine**
- Analgesics: effect of tramadol decreased by carbamazepine
- Antibacterials: metabolism of doxycycline increased; plasma concentration of carbamazepine increased by erythromycin and isoniazid
Anticoagulants: metabolism of acenocoumarol and warfarin increased
Antidepressants: antagonism of anti-convulsant effect; plasma concentration of carbamazepine increased by fluoxetine

Other antiepileptics
Concomitant administration of two or more antiepileptics may enhance toxicity without a corresponding increase in antiepileptic effect
Antimalarials: chloroquine antagonize anticonvulsant effect
Antipsychotics: antagonism of anticonvulsant effect
Calcium channel blockers: verapamil increases the effect of carbamazepine
Cyclosporin: metabolism of cyclosporin accelerated
Corticosteroids: metabolism of corticosteroids accelerated
Diuretics: increased risk of hyponatraemia
Estrogens and progestogens: metabolism of OCP accelerated

Cardiac glycosides
Include digoxin
Antiarrythmics: plasma concentration of digoxin increased by amiodarone
Antibacterials: erythromycin enhance the effect of digoxin
Calcium channel blockers: plasma concentration of digoxin increased by verapamil
Diuretics: increased toxicity if hyponatraemia occurs with acetazolamide, loop and thiazide diuretics; effect of digoxin increased by spironolactone

Cephalosporins
Includes cephalexin, cephazolin, ceftriaxone, cefotaxime
Diuretics: loop diuretics may increase nephrotoxicity with cephalosporin

Chloramphenicol
Anticoagulants: effect of acenocoumarol and warfarin enhanced
Antidiabetics: effect of sulphonylureas increased
Antiepileptics: metabolism of chloramphenicol accelerated by phenobarbitone

Chloroquine
Antiarrythmics: chloroquine increases the risk of ventricular arrhythmias with amiodarone
Antiepileptics: antagonism of anticonvulsant effect
Cardiac glycosides: chloroquine increases the concentration of digoxin
Cyclosporin: chloroquine increase concentration of cyclosporine

Ciprofloxacin
Antacids: reduced absorption of ciprofloxacin
Artemether+Lumefantrine: manufacturer of artemether with lumefantrine advises avoid concomitant use
Cyclosporin: increased risk of nephrotoxicity
Ferrous salts: absorption of ciprofloxacin reduced by oral ferrous salts
Ibuprofen: possibly increased risk of convulsions
Morphine: manufacturer of ciprofloxacin advises avoid premedication with morphine (reduced plasma-ciprofloxacin concentration).

Phenytoin: plasma-phenytoin concentration possibly altered by ciprofloxacin

Theophylline: increased plasma theophylline concentration; possible increased risk of convulsions

Warfarin: enhanced anti-coagulant effect

Cyclosporin

ACE inhibitors and angiotensin II antagonists: increased risk of hyperkalaemia

Analgesics: increased risk of nephrotoxicity with NSAIDs

Antibacterials: aminoglycosides, cotrimoxazole and quinolones increase risk of nephrotoxicity

Antiepileptics: carbamazepine, phenytoin & phenobarbitone increase metabolism of cyclosporin

Antifungals: griseofulvin possibly decreases plasma cyclosporin concentration

Calcium channel blockers: verapamil increases plasma cyclosporin concentration

Corticosteroids: cyclosporin increases concentration of prednisolone

Cotrimoxazole

Antiarhythmics: cotrimoxazole increases risk of ventricular arrhythmias with amiodarone

Other Antibacterial: increased risk of crystaluria with sulphonamides
Anticoagulants: effect of warfarin enhanced
Antiepileptics: antifolate effect and plasma concentration of phenytoin increased by cotrimoxazole
Cyclosporin: increased risk of nephrotoxicity
Cytotoxics: antifolate effect of methotrexate increased by cotrimoxazole

**Cyclophosphamide**
Other cytotoxics: increased toxicity with high dose cyclophosphamide

**Cycloserine**
Alcohol: increased risk of seizures

**Dapsone**
Antibacterials: plasma concentration reduced by rifampicin

**Diltazem**
See under calcium channel blocker

**Diuretics**
Includes hydrochlorothiazide, furosemide, mannitol and acetazolamide
ACE inhibitors and angiotensin II antagonists: enhanced hypotensive effect
Analgesics: diuretics increase risk of nephrotoxicity of NSAIDs. Indomethacin antagonizes diuretic effect; diuretic effect of spironolactone antagonized by aspirin; aspirin reduces excretion of acetazolamide. Indomethacin increases risk of hyperkalaemia with potassium sparing diuretics
Antiarhythmics: cardiac toxicity of amiodarone increased if hypokalaemia occurs
Antibacterials: loop diuretics increase ototoxicity of aminoglycosides; loop diuretics may increase nephrotoxicity of cephalosporins
Antiepileptics: increased risk of hyponatraemia with carbamazepine; acetazolamide increases concentration of carbamazepine
Antihypertensive: enhanced hypotensive effect
Cardiac glycosides: increased toxicity if hypokalaemia occurs with acetazolamide, loop and thiazide diuretics
Cyclosporin: increased risk of hyperkalaemia with potassium sparing diuretics
Potassium salts: hyperkalaemia with potassium sparing diuretics

**Doxorubicin**
Cyclosporin: increased risk of neurotoxicity

**Ergot alkaloids**
Includes ergotamine, methylergometrine
Antibacterials: increased risk of ergotism with erythromycin and tetracyclines
Erythromycin
Antiarhythmics: parenteral erythromycin increases risk of ventricular arrhythmias with amiodarone
Anticoagulants: effect of acenocoumarol and warfarin enhanced
Antiepileptics: erythromycin inhibit metabolism of carbamazepine
Antimalarials: avoid concomitant use with coartem®
- Cyclosporin: erythromycin inhibit metabolism
- Ergometrine and ergotamine: increased risk of ergotism - avoid concomitant use
- Lipid regulating medicines: erythromycin increases risk of myopathy with atorvastatin
- Theophylline: increased plasma concentration of theophylline

**Fluconazole**
- Amphotericin B: possible antagonism of effect of amphotericin B
- Coartem®: avoid concomitant use with fluconazole
- Ciclosporin: metabolism of ciclosporin inhibited (increased plasma concentration)
- Contraceptives, oral: anecdotal reports of failure of estrogen containing contraceptives.
- Glibenclamide: plasma concentration of glibenclamide increased
- Hydrochlorothiazide: plasma concentration of fluconazole increased
- Nevirapine: increased concentration of nevirapine
- Phenytoin: plasma concentration of phenytoin increased
- Rifampicin: accelerated metabolism of fluconazole there by reducing plasma concentration
- Ritonavir: plasma concentration of fluconazole increased by ritonavir
- Saquinavir: plasma concentration of saquinavir possibly increased
- Warfarin: enhanced anticoagulant effects
- Zidovudine: increased plasma concentration of zidovudine (increased risk of toxicity)

**Fluorouracil (5-FU)**
- Anticoagulants: possibly enhances effect of warfarin and other coumarins

**Fenofibrate**
- Anticoagulants: enhanced effect of oral Anticoagulants including warfarin; dose of Anticoagulants may need to be reduced
- Antidiabetics: enhanced effect of sulphonylureas and insulin
- Ciclosporin: increased risk of renal impairment
- Statins: increased risk of myopathy; avoid concomitant use

**Grisoefulvin**
- Anticoagulants: reduced effect of warfarin and acenocoumarol
- Estrogens and progestogens: reduced contraceptive effect

**Hydralazine**
- Anaesthetics: enhanced hypotensive effect

**Ibandronate**
- Antacids: absorptions of bisphosphonates reduced by antacids
- Antibacterials: increased risk of hypocalceamia when bisphosphonates given with aminoglycosides
- Calcium salts: absorption of bisphosphonates reduced by calcium salts
Iron: absorption of bisphosphonates reduced by oral iron

Iron (ferrous sulphate)

Antibacterials: tetracyclines reduce absorption of oral iron (and vice versa)

Isoniazid

Antiepileptics: metabolism of carbamazepine and phenytoin inhibited; with carbamazepine, isoniazid hepatotoxicity increase

Lamotrigine

Antibacterials: plasma concentration of lamotrigine reduced by rifampicin

Antidepressants: anti-convulsant effect of anti-epileptics possibly antagonized by MAOIs and TCAs (convulsive threshold lowered); anti-convulsant effect of antiepileptics antagonized by SSRIs and tricyclics (convulsive threshold lowered)

Antiepileptics: plasma concentration of lamotrigine often reduced by carbamazepine and oxycarbamezapine, phenytoin; plasma concentration of lamotrigine increased by valproate

Chloroquine: possible increased risk of convulsions

Phenobarbital: plasma concentration of lamotrigine reduced

Estrogens: plasma concentration of Lamotrigine reduced

Progestogens: plasma concentration of lamotrigine reduced by progestogens

Levetiracetam

Antidepressants: anti-convulsant effect possibly antagonized by SSRIs and TCAs

Antimalarials: anti-convulsant effect possibly decreased with chloroquine

Levodopa (with carbidopa)

Anaesthetics: risk of arrhythmias with volatile liquid anaesthetics such as halothane

Low molecular weight heparin

ACEIs: increase risk of hyperkalemia when heparins given with ACEIs

Analgesics: possible increase risk of bleeding heparins given with NSAIDs; increased risk of haemorrhage when heparin given with IV diclofenac; increase risk of haemorrhage when heparin given with ketorolac; anticoagulants effects of heparins enhanced by aspirin

Angiotensin II receptor antagonists: increase risk of hyperkalemia when heparin given with angiotensin II receptor antagonist

Clopidogrel: increased risk of bleeding when heparin given with clopidogrel

Dipyridamole: anticoagulants effect of heparins enhanced by dipyridamole

Nitrates: anticoagulant effect of heparins reduced by infusion of glyceryl trinitrates

Macrolides

Includes erythromycin and clarithromycin

Anticoagulants: macrolides possibly enhance anti coagulants effects of coumarins

Antiepileptics: erythromicn increases plasma concentration of carbamazepine; clarithromycin inhibits metabolism of phenytoin (plasma
concentration increased); erythromycin inhibits metabolism of valporate (plasma concentration increased)

- Antifungal: clarithromycin increases the plasma concentration of itraconazole
- Antivirals: plasma concentration of erythromycin possibly increased by ritonavir
- Calcium channel blockers: erythromycin possibly inhibits the metabolism of verapamil (increased risk of toxicity)
- Cardiac glycosides: macrolides increase plasma concentration of digoxin (increased risk of toxicity)
- Corticosteroids: erythromycin possibly inhibits metabolism of methylprednisolone
- Ergot alkaloids: increase risk of ergotism when macrolides given with ergotamine - avoid concomitant use
- Lipid regulating medicines: possible increase risk of myopathy when erythromycin given with atorvastatin
- Estrogen: antibacterials that do not induce liver enzymes possibly reduce contraceptive effect of estrogen
- Sildenafil: erythromycin increase plasma concentration of sildenafil - reduce initial dose of sildenafil
- Theophylline: erythromycin inhibits the metabolism of theophylline

Magnesium salts
- Calcium channel blockers: profound hypotension reported with nifedipine and IV MgSO4 in pre-eclampsia

Methotrexate
- Anaesthetics: antifolate effect increased by nitrous oxide (avoid concomitant use)
- Analgesics: excretion reduced by aspirin, diclofenac, indomethacin and ibuprofen
- Antibacterials: antifolate effect increased by cotrimoxazole (avoid concomitant use)
- Cyclosporin: increased toxicity
- Corticosteroids: increased risk of haematological toxicity

Methyldopa
- Anaesthetics: enhanced hypotensive effect

Methylprednisolone
- ACEIs: corticosteroids antagonise the hypotensive effect of ACEIs
- Adrenergic neuron blockers: corticosteroids antagonise hypotensive effect of andrenergic neuron blockers
- Alpha-blockers: corticosteroids antagonise the hypotensive effect of alpha blockers
- Analgesics: increased risk of gastrointestinal bleeding and ulceration when corticosteroids given with NSAIDs; increased risk of GI bleeding and ulceration when corticosteroids given with aspirin, also corticosteroids reduce plasma concentration of salicylate
- Aginotensin II receptor antagonists: corticosteroids antagonise hypotensive effects of angiotension II receptor
  - See under corticosteroids under appendix 1

**Metoclopramide**
- Cyclosporin: increased plasma-cyclosporin concentration

**Metronidazole**
- Anticoagulants: effect of warfarin enhanced
- Antiepileptics: metronidazole inhibits metabolism of phenytoin; phenobarbitone accelerates metabolism of metronidazole

**Moxifloxacin**
- See under quinolones

**Muscle Relaxants**
- Non depolarizing relaxants includes atracurium, vecuronium while depolarizing muscle relaxant include suxamethonium
- Thiopentone sodium and succinylicholine solutions should not be mixed in the same syringe due to chemical interaction.
- General anaesthetics: potentiate non depolarizing muscle relaxants
- Anticholinesterase: reverses the action of non depolarising muscle relaxants
- Calcium channel blockers: verapamil and others potentiate both depolarizing and non-muscle relaxants
- Adrenaline: reduces action of non-depolarizing muscle relaxant by increasing Ach release
  - Diuretics: diuretic induced hypokalemia enhances action of non-depolarizing muscle relaxants

**Mycophenolate**
- Antacids: absorption reduced by antacids
- Antiviral: may increase concentration of acyclovir

**Nitroglycerine**
- Includes nitroglycerine, isosorbide dinitrate
- Anticoagulants: excretion of heparin increased by glycercyl trinitrate infusion

**NSAIMs**
- Includes aspirin, ibuprofen, mfenamic acid and diclofenac
- ACE inhibitors and angiotensin II antagonists: antagonism of hypotensive effect
- Other analgesics: avoid concomitant administration of two or more NSAIMs (increased side effects)
- Antibacterials: NSAIMs possibly increase risk of convulsion with quinolones
- Anticoagulants: effect of warfarin enhanced; increased risk of bleeding with heparin
- Cyclosporin: increased risk of nephrotoxicity
- Cytotoxics: excretion of methotrexate reduced by aspirin

**Diuretics**
- Increased risk of nephrotoxicity with NSAIMs
Indomethacin antagonize diuretic effect

Oestrogens
- Includes ethinyloestradiol and conjugated estrogen
- Antibacterials: contraceptive effect of estrogens possibly reduced by broad spectrum antibacterial and penicillin
- Anticoagulants: estrogens antagonize anti-coagulant effect of coumarins
- Antidepressants: estrogens antagonize anti-depressant effect of tricyclics
- Antiepileptics: metabolism of estrogens accelerated by carbamazepine and phenytoin
- Antifungals: metabolism accelerated by griseofulvin
- Antiviral: metabolism accelerated by nevirapine
- Barbiturates: metabolism accelerated by barbiturates

Opioid analgesics
- Includes codeine, morphine, tramadol, pethidine
- Antidepressants: tramadol increases risk of CNS toxicity with SSRIs (e.g., fluoxetine) and tricyclics (e.g. amitriptyline)
- Antiepileptics: effect of tramadol decreased by carbamazepine
- Antipsychotics: enhanced sedative and hypnotics effect

Oxytocin
- Anaesthetics: inhalational anaesthetics possibly reduce oxytocic effect (also enhanced hypotensive effect and risk of arrhythmias)

Oxymetazoline
See under sympathomimetics

Pentoxifylline
- Analgesics: increased risk of bleeding with NSAIDs

Phenylephrine
See under sympathomimetics

Phenytoin
- Analgesics: plasma phenytoin concentration increased by aspirin and possibly other NSAIDs
- Antiarrhythmics: amiodarone increases plasma phenytoin concentration
- Antibacterials: plasma phenytoin concentration increased by chloramphenicol, isoniazid and metronidazole: plasma concentration and antifolate activity increased by cotrimoxazole; plasma phenytoin concentration reduced by rifampicin; plasma concentration of doxycycline reduced by phenytoin.
- Anticoagulants: metabolism of warfarin accelerated
- Anticonvulsants: antagonism of anticonvulsant effect
- Antifungals: plasma concentration of ketoconazole reduced
- Antimalarials: chloroquine occasionally reduces convulsive threshold
- Antipsychotics: antagonism of anticonvulsant effect
- Cyclosporin: metabolism of cyclosporin accelerated
- Corticosteroids: metabolism of corticosteroids accelerated
Estrogens and progestogens: metabolism of OCP accelerated
Ulcer healing medicines: omeprazole enhances the effect of phenytoin

Potassium salts
ACE inhibitors and angiotensin II antagonists: increased risk of hyperkalemia
Cyclosporin: increased risk of hyperkalemia
Diuretics: hyperkalemia with potassium sparing diuretics

Progestogens
Includes medroxyprogesterone
Cyclosporin: increased plasma cyclosporin concentration

Proton pump inhibitors
Includes omeprazole
Anticoagulants: effect of warfarin enhanced by omeprazole

Quinine
Antiarrhythmics: increased risk of ventricular arrhythmias with amiodarone
Other antimalarials: avoid concomitant use with coartem®
Cardiac glycosides: plasma concentration of digoxin increased

Quinolones
Includes ciprofloxacin, norfloxacin, ofloxacin
Analgesics: possible increased risk of convulsions with NSAIDs; manufacturer of ciprofloxacin advises avoid pre-medication with opioid analgesics
Antiarrhythmics: increased risk of ventricular arrhythmias with amiodarone
Other antibacterial: increased risk of ventricular arrhythmias with parenteral erythromycin
Anticoagulants: anticoagulant effect of warfarin enhanced
Antidepressants: increased risk of ventricular arrhythmias with tricyclics
Antimalarials: avoid concomitant use with coartem®
Antipsychotics: increased risk of ventricular arrhythmias with haloperidol
Cyclosporin: increased risk of nephrotoxicity
Theophylline: possibly increased risk of convulsions
Zinc salts: zinc reduces the absorption of ciprofloxacin and norfloxacin

Ranitidine
Antacids: reduce its absorption when taken at the same time with antacid preparations
Antifungal: decreases absorption of ketoconazole

Rifampicin
Other antibacterial: metabolism of chloramphenicol accelerated; plasma concentration of dapsone reduced
Anticoagulants: metabolism of warfarin and acenocoumarol accelerated
Antiepileptics: metabolism of phenytoin accelerated
Antifungals: metabolism of ketoconazole accelerated
Calcium channel blockers: metabolism of nifedipine and verapamil accelerated
Cyclosporin: metabolism accelerated by rifampicin
Corticosteroids: metabolism of steroids accelerated
Estrogens and progestogens: metabolism of both combined and progestogen-only contraceptive reduced

**Sodium bicarbonate**
See under antacids

**Sucralfate**
- Antibacterials: reduced absorption of ciprofloxacin, norfloxacin, ofloxacin and tetracyclines
- Anticoagulants: absorption of warfarin possibly reduced
- Antiepileptics: reduced absorption of phenytoin

**Sympathomimetics**
- Includes adrenaline
- Anaesthetics: risk of arrhythmias if adrenaline given with volatile liquid anaesthetics such as halothane
- Beta-blockers: severe hypertension with adrenaline and possibly with dobutamine

**Tenofovir**
- Lopinavir: plasma concentration of tenofovir increased
- Cidofovir: combination of tenofovir with cidofovir may increase plasma concentration of either drugs (or both)

**Tetracyclines**
- Includes doxycycline
- Cyclosporin: doxycycline possibly increases plasma cyclosporin concentration
- Antacids: reduced absorption with antacids
- Calcium salts: reduced absorption of tetracyclines
- Iron: reduced absorption of tetracyclines and vice versa

**Theophylline**
- Includes deriphylline
- Antibacterials: possible increased risk of convulsions with quinolones; plasma concentration increased by ciprofloxacin, erythromycin, isoniazid and norfloxacin; plasma concentration reduced by rifampicin
- Antifungals: plasma concentration increased by ketoconazole
- Calcium channel blockers: plasma theophylline concentration increased by verapamil

**Thyroids hormones**
- Includes thyroxine
- Anticoagulants: effect of warfarin enhanced

**Tranexam acid**
- Chlorpromazine: may increase cerebral vasospasm and ischemia
Valproate
- Antidepressants: antagonism of anticonvulsant effect
- Antimalarials: chloroquine occasionally reduces convulsive threshold
- Antipsychotics: antagonism of anticonvulsant effect

Vancomycin
- Cyclosporin: increased risk of nephrotoxicity
- Cisplatin: increased risk of nephrotoxicity and possibly of ototoxicity
- Ether anesthetic: hypersensitivity-like reactions can occur with concomitant intravenous vancomycin
- Frusemide: increased risk of ototoxicity
- Gentamycin: increased risk of nephrotoxicity and ototoxicity
- Halothane, nitrous oxide, ketamine and thiopental: hypersensitivity-like reactions can occur with concomitant intravenous vancomycin
- Streptomycin: increased risk of nephrotoxicity and ototoxicity

Venlafaxine
- Analgesics: increase risk of bleeding when venlafaxine given with NSAIMs and aspirin
- Anticoagulants: venlafaxine possibly enhances anticoagulant effects of warfarin
- Antidepressants: possible increase serotonergic effects when venlafaxine given with duloxetine; enhanced CNS effect and toxicity when venlafaxine given with MAOIs; after stopping SSRI-related antidepressants do not start moclobemide for at least one week
- Antipsychotics: venlafaxine increases plasma concentration of clozapine and haloperidol
- Dopaminergic: cautions with venlafaxine advised by manufacturer of entacapone; increase risk of hypertension and CNS excitation when venlafaxine given with selegiline

Vitamins
- Anticoagulants: effect of warfarin antagonized by vitamin K

Warfarin and other coumarins
- Includes warfarin
- Analgesics: aspirin increase risk of bleeding due to antiplatelet effect
- Antiarrhythmics: amiodarone enhances anticoagulant effect
- Antibacterials: anticoagulant effect reduced by rifampicin; effect enhanced by chloramphenicol, ciprofloxacin, cotrimoxazole, erythromycin, metronidazole and ofloxacin
- Antiepileptics: reduced anticoagulant effect carbamazepine and phenobarbital; anticoagulant effect possibly increased by valproate
- Antifungals: effect reduced by griseofulvin; effect enhanced by ketoconazole
- Antiplatelet medicines: aspirin increase risk of bleeding
- Barbiturates: anticoagulant effect reduced
- Corticosteroids: anticoagulant effect possibly altered
- Cytotoxics: effect enhanced by fluorouracil
- Estrogens and progestogens: OCP reduce anticoagulant effect
- Thyroids hormones: enhanced anticoagulant effect
- Vitamin k: reduced anticoagulant effect

**Zinc**

- Antibacterials: reduced absorption of ciprofloxacin and norfloxacin; tetracyclines reduce absorption of zinc and vice versa
## Appendix 2: Malaria Treatment Regimen

### Treatment regimen for P. vivax: Protocol A

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Medicine</th>
<th>Day 0</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3 to 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>Chloroquine</td>
<td>½ tab (7.5ml syrup)</td>
<td>½ tab (7.5ml syrup)</td>
<td>¼ tab (3.75ml syrup)</td>
<td>-</td>
</tr>
<tr>
<td>1- 4 years</td>
<td>Chloroquine Primaquine</td>
<td>1 tab (15ml syrup)</td>
<td>½ tab (15ml syrup)</td>
<td>½ tab (7.5ml syrup)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Chloroquine</td>
<td>½ tab</td>
<td>½ tab</td>
<td>½ tab</td>
<td>½ tab each</td>
</tr>
<tr>
<td>4 - 8 years</td>
<td>Chloroquine Primaquine</td>
<td>2 tabs</td>
<td>2 tabs</td>
<td>1 tab</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Chloroquine</td>
<td>1 tab</td>
<td>1 tab</td>
<td>1 tab</td>
<td>1 tab each</td>
</tr>
<tr>
<td>8 - 14 years</td>
<td>Chloroquine Primaquine</td>
<td>3 tabs</td>
<td>3 tabs</td>
<td>1 ½ tab</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Chloroquine</td>
<td>1 ½ tabs</td>
<td>1 ½ tab</td>
<td>1 ½ tab</td>
<td>1½ tab each</td>
</tr>
<tr>
<td>14 years &amp; above</td>
<td>Chloroquine Primaquine</td>
<td>4 tabs</td>
<td>4 tabs</td>
<td>2 tabs</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Chloroquine</td>
<td>2 tabs</td>
<td>2 tabs</td>
<td>2 tabs</td>
<td>2 tabs each</td>
</tr>
</tbody>
</table>

### NOTE

- The dose for chloroquine is calculated as base. E.g. if you need to give 300mg of chloroquine, that will be equivalent to 2 tablets of chloroquine. For children under 5 years Chloroquine 50mg/5ml syrup may be used.

- Dosage should be calculated by per kilogram (kg) body weight in children wherever possible, viz. chloroquine, 10 mg/kg on day 0 and 1 and 5 mg/kg on day 2, and primaquine 0.25 mg/ kg.

- Primaquine treatment period is 14 days except for pregnant women and children under 1 year where it is contraindicated.

- If the patient vomits within 1 hr of taking the medicine, the dose should be repeated.
### Treatment regimen for uncomplicated falciparum malaria: Protocol B

<table>
<thead>
<tr>
<th>Patient category</th>
<th>Medicines</th>
<th>Daily dose</th>
<th>No. of days of treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 kg</td>
<td>Quinine</td>
<td>10mg/kg IM 8 hrly (Max of 600mg/dose)</td>
<td>3 (may be extended up to 7 days depending on clinical response)</td>
</tr>
<tr>
<td>5 - 14 kg</td>
<td>Artemether (ART) + lumefantrine(L)</td>
<td>1 tablet at 0, 8, 24, 36, 48 and 60 hrs</td>
<td>3</td>
</tr>
<tr>
<td>15 – 24 kg</td>
<td>Artemether (ART) + lumefantrine(L)</td>
<td>2 tablets at 0, 8, 24, 36, 48 and 60 hrs</td>
<td>3</td>
</tr>
<tr>
<td>25 – 34 kg</td>
<td>Artemether (ART) + lumefantrine(L)</td>
<td>3 tablets at 0, 8, 24, 36, 48 and 60 hrs</td>
<td>3</td>
</tr>
<tr>
<td>&gt;35 kg</td>
<td>Artemether (ART) + lumefantrine(L)</td>
<td>4 tablet at 0, 8, 24, 36, 48 and 60 hrs</td>
<td>3</td>
</tr>
<tr>
<td>1st trimester pregnancy</td>
<td>Quinine 300mg tab + proguanil 100mg + dapsone 100mg</td>
<td>600mg 8 hourly followed by dapsone (1/2 tab) 12 hourly + proguanil 1 tablet 12 hourly for 4 more days.</td>
<td>Three day quinine followed by 4 days of dapsone &amp; proguanil.</td>
</tr>
<tr>
<td>* 2nd and 3rd trimester pregnancy</td>
<td>Quinine 300mg tab + dapsone 100mg + proguanil 100mg</td>
<td>100mg 12 hourly OR 300mg 8 hourly followed by dapsone (1/2 tab) 12 hourly + proguanil (1 tab) 12 hourly for 4 more days.</td>
<td>Three day quinine followed by 4 days of dapsone &amp; proguanil.</td>
</tr>
</tbody>
</table>

**Note:**
- The medicine must be administered under direct supervision; total 6 doses at 0, 8, 24, 36, 48 and 60 hours are administered; the second dose is administrated after 8 hours and then there after the rest of the dose must be continued every 12 hourly till last dose at 60 hours.
If the patient vomits within 1 hour of taking the medicine, the dose should be repeated.

Coartem® is not recommended in pregnant women; for pregnant women in 1st, 2nd and 3rd trimester, the old regimen with quinine/artisunate with dapsone and proguanil will be followed. WHO recommends dual therapy in pregnancy with clindamycin (not on the EML).

For uncomplicated P. falciparum infection, if the coartem® is out of stock or if it is not suitable for some patients due to hypersensitivity reaction, use artesunate/doxycycline combination for adult and artisunate/dapson/proguanil combination if doxycycline is contraindicated.

A stat dose of primaquine on day 3 should be given to treat gametocytes of falciparum except in pregnant women and children less than 5 years of age.
### Antimalarial medicines for the treatment of severe malaria: Protocol C

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Route of administration</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artemether</td>
<td>IM</td>
<td>3.2mg/kg body weight IM given on admission then 1.6mg/kg IM once a day followed by a full course of combination therapy (coartem®) as soon as patient can swallow</td>
</tr>
<tr>
<td>Quinine</td>
<td>IV</td>
<td>Loading dose of 20mg/kg body weight of quinine given over a 4-hour period in IV fluid (glucose 5% preferred to prevent hypoglycaemia); then give maintenance dose of 10 mg/kg after 8 hours. This should be repeated until the patient is able to take quinine tablet orally. The oral dose of quinine is 10mg/kg body weight given every eight hours. The total duration of treatment is 7 days including both IV and oral treatment. Quinine can be given by IM injections in the same dosage if IV infusion is not possible. It should be diluted in 0.9% sodium chloride to a concentration of 60-100 mg/ml salt, the dose divided equally and administered on the two anterior thighs (not on the buttock).</td>
</tr>
</tbody>
</table>

**Note:** Primaquine should be given to all cases except pregnant women and children under 1 year; dose of primaquine (each primaquine tablet is 7.5mg base) is as follows:

- Children 1-4 years: 7.5mg base (1 tablet)
- Children 5-8 years: 15mg base (2 tablets)
- Children 9-14 years: 22.5mg base (3 tablets)
- Above 15 years: 30mg base (4 tablets)

A loading dose of quinine should not be given:
- If the patient has received quinine within the preceding 12 hrs, or the previous history of medicine intake cannot be ascertained
• The weight of the patient cannot be taken
• Facilities for controlled rate of flow of quinine infusion is not available
• Facilities to treat complications of quinine toxicity do not exist.

If above conditions exist, patient should be treated with maintenance dose of quinine only. If there is no clinical improvement after 48 hours of parenteral quinine therapy, the maintenance dose of parenteral quinine should be reduced by one-third to one half (i.e. 5-7 mg/kg quinine). Total daily dose of quinine in patients requiring parenteral therapy beyond 48 hours is as follows:

**Adults:**
- Day 0: 30-40 mg/kg of body weight
- Day 1: 30 mg/kg of body weight
- Day 2 and subsequent days: 15-21 mg/kg of body weight.

*The maximum dosage should not exceed 2000mg per day.*

**Children:**
- Day 0: 30-40 mg/kg of body weight
- Day 1: 20 mg/kg of body weight
- Day 2 and subsequent days: 10-14 mg/kg of body weight.

*The maximum dosage should not exceed 600mg per dose or 1800mg per day.*

- Loading dose of quinine can be given at recommended doses even in acute renal failure (ARF) or severe jaundice up to 48 hrs. Subsequent doses should be reduced to half. In such cases, the volume of infusion fluid for administration of quinine can be reduced to half (quinine dihydrochloride 10 mg salt/ kg body weight diluted in 5% dextrose, 5 ml/kg body weight, or 1 mg of quinine salt/ 0.5 ml of fluid)
- Quinine is not contraindicated in pregnancy
- Monitor pulse and blood pressure at least every 2 hrs while the patient is on quinine infusion
- Avoid standing and sitting postures of the acutely sick patient during quinine therapy to prevent severe postural hypotension.

An uncomplicated *P. falciparum* malaria patient can progress to severe and complicated state if not treated early and appropriate.

**Appendix 3: Immunization schedule**

<table>
<thead>
<tr>
<th>Antigen</th>
<th>No of dose</th>
<th>Children/Age</th>
<th>Adult</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>1</td>
<td>At birth</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>1</td>
<td>At birth (within 24 hours)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oral Polio Vaccine (OPV)</td>
<td>3</td>
<td>At birth (within 0-14 days), 6 weeks, 10 weeks, 14 weeks</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Inactivated polio vaccine (IPV)</td>
<td>1</td>
<td>14 weeks</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DPT-HepB-Hib (pentavalent)</td>
<td>3</td>
<td>6 weeks, 10 weeks, 14 weeks</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Measles, Mumps and Rubella (MMR) Vaccine</td>
<td>2</td>
<td>9 Months, 24 months</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DTP</td>
<td>1</td>
<td>24 Months</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vaccine</td>
<td>Dosage</td>
<td>Dose</td>
<td>Site/route</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
<td>---------------------------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Td1</td>
<td>0.5ml</td>
<td>1st contact or as early as possible in pregnancy</td>
<td>IM</td>
<td></td>
</tr>
<tr>
<td>Td2</td>
<td>0.5ml</td>
<td>After 4 weeks of Td1</td>
<td>IM</td>
<td></td>
</tr>
<tr>
<td>Td3</td>
<td>0.5ml</td>
<td>6 months after Td2 or one dose in subsequent pregnancy</td>
<td>IM</td>
<td></td>
</tr>
<tr>
<td>Td4</td>
<td>0.5ml</td>
<td>1 year after Td3 or one dose in subsequent pregnancy</td>
<td>IM</td>
<td></td>
</tr>
<tr>
<td>Td5</td>
<td>0.5ml</td>
<td>1 year after Td4 or one dose in subsequent pregnancy</td>
<td>IM</td>
<td></td>
</tr>
</tbody>
</table>
### Td vaccination schedule for adult including pregnant women (without documentation of childhood immunization)

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Category</th>
<th>No of Dose</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>With documentary evidence of pry series</td>
<td>3 doses</td>
<td>2 dose at least 1 month apart; 3rd dose during next pregnancy</td>
</tr>
<tr>
<td>2</td>
<td>With documentary evidence of 3rd dose DPT booster at 6 years and 12 years of TT/Td vaccination</td>
<td>2 doses</td>
<td>1 dose at 1st contact; 2nd dose after 6 month or during next pregnancy</td>
</tr>
<tr>
<td>3</td>
<td>With documentary evidence of pry series, booster dose at 6 years and TT/Td vaccination at 12 years</td>
<td>1 dose</td>
<td>1 dose on 1st contact or 1st pregnancy</td>
</tr>
</tbody>
</table>
Appendix 4: Emergency treatment of poisoning (specific medicines)

These notes are only guidelines and it is strongly recommended that appropriate health professionals be consulted where there is a doubt.

**HOSPITAL ADMISSION:** All patients who show feature of poisoning should generally be admitted to hospitals. Patients who have taken poisons with delayed action should also be admitted, even if they appear well; delayed-action poisons include aspirin, iron, paracetamol etc.

**GENERAL CARE**

General care in principle is always ABC.

**A. Airway**

An obstructed airway requires immediate attention. Lift the chin, remove dentures and oral secretions, hold the jaw forward, and insert an oropharyngeal airway if available, and turn the patient to semi prone position with the head down.

**B. Breathing**

Assisted ventilation by mouth-to-mouth may be needed; where available an ambu bag is a better choice. Oxygen is not a substitute for adequate ventilation but it should always be given in the highest concentration possible in poisoning especially in carbon monoxide poisoning and other irritant gases. Respiratory stimulants do not help and are potentially dangerous.

**C. Circulation**

Hypotension or shock is common in severe poisoning especially with CNS depressants. The patients should be carried head down on a stretcher and must be in this position in the ambulance also. Oxygen should be given to relieve hypoxia and an IV infusion set up if necessary. Cardiac conduction defects and arrhythmias may occur in any acute poisoning, e.g. tricyclic antidepressants. If serious ventricular arrhythmias are confirmed by ECG, the injection lignocaine 2% IV will be needed (bolus and infusion).

**Body temperature**

Hypothermia may develop in patients who have been deeply unconscious for several hours. It is best treated by wrapping the patients to conserve body heat. Hyperthermia is initially managed by removing all unnecessary clothing. Sponging with tepid water will promote evaporation; iced water should not be used. Both hypothermia and hyperthermia require urgent hospitalization for assessment and supportive treatment.

**Convulsions**

Diazepam 10-20mg by slow IV injection should be given if convulsions are protracted or reoccurs frequently. The dose may be repeated after 30-60minutes if necessary. Child: 200-300mcg/kg-body weight.

**Removal and Elimination**

**Removal from the stomach**

The dangers of attempting to empty the stomach have to be balanced against the toxicity of the ingested poison. Gastric emptying is clearly unnecessary if the risk of toxicity is small or if the patients arrive too late. Emesis induced by ipecacuahua has been used in adults (30ml) and children (5-15ml), but there is no evidence that it presents clinically significant absorption. It should only be considered if the patient is fully conscious, if the poison ingested is neither corrosive nor a petroleum distillation or if it is not adsorbed by activated charcoal.
Prevention of absorption
Given by mouth; activated charcoal can bind many poisons thereby reducing their absorption. The sooner it is given, the more effective it is. The usual dose for activated charcoal is as follows: ADULT: 50g every 2-4 hours; CHILD: 10-15g every 2-4 hours.

Other Poisons
Snake Bites and Insect Stings
SNAKE BITE may cause local and systemic effects like pain, swelling, tender enlargement of lymph nodes, angioedema, hypotension, diarrhoea, vomiting, acute renal failure, ECG abnormalities and systemic bleeding. Anti-snake venom serum, 10ml is given by slow IV. A further 10-20ml may be given after 2 hours or less.

INSECT STINGS from ants, bees, and wasps cause local pain and swelling. If the sting is in the mouth or on the tongue, marked swelling may cause airway obstruction. The stings from these insects are usually treated by cleaning the area, applying ice and if necessary local application of steroids. Anaphylactic reactions require treatment with IM adrenaline.

Specific Medicines
General care should be given as above, the first and foremost being active elimination by vomiting. Other signs and symptoms may be treated specifically as outlined. The “remarks” column indicates specific actions that need to be taken.
<table>
<thead>
<tr>
<th>Medicines</th>
<th>Signs and Symptoms</th>
<th>Remarks</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salicylates e.g. aspirin, methyl salicylate, salicylic acid</td>
<td>Fast breathing, fever and sweating, dry tongue, drowsiness, nausea and vomiting</td>
<td>Other ways to remove salicylates from the body is by making the urine alkaline by giving sodium bicarbonate or by haemodialysis</td>
<td></td>
</tr>
<tr>
<td>Atropine, antihistamines, ephedrine and related substances</td>
<td>Antihistamines - drowsiness, dry mouth, headache, nausea, fast pulse, shallow breathing (Child-wide pupils, shaking, high temp, fits) Atropine - red, dry skin, wide pupils, blurred vision, dry mouth, confusion, fast pulse, fever, fits Ephedrine - nausea, vomiting, headache, irritability, hallucinations, fever, fast pulse, high BP, wide pupils</td>
<td>Do not use chlorpromazine to treat agitated patients who are poisoned by atropine</td>
<td></td>
</tr>
<tr>
<td>Aminophylline and theophylline</td>
<td>Nausea and vomiting, fast pulse, restlessness, headache, sleeplessness, hallucinations, fast breathing, unconsciousness in some cases, vomiting blood, fits which may occur suddenly, low BP, irregular pulse</td>
<td>Haemodialysis may be indicated in severe poisoning</td>
<td></td>
</tr>
<tr>
<td>Amitriptyline, chloroquine and quinine</td>
<td>Amitriptyline - dry mouth, blurred vision, fast-irregular pulse, shallow breathing, fits, low BP, hallucinations &amp; confusion Chloroquine (within 3 hrs) - vomiting, diarrhoea, headache, dizziness, fits, low BP, irregular pulse. (NOTE* the patient may be very ill within 1 hr and may die within 2-3 hrs of taking the medicine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicines</td>
<td>Signs and Symptoms</td>
<td>Remarks</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Quinine</td>
<td>- nausea and vomiting, large pupils, blurred vision, dizziness, headache, fever, excitement, fast pulse, fits, low BP, blindness (partial or complete), unconsciousness</td>
<td>If the patient is an epileptic taking phenobarbital, wait 48 hrs after the patient has woken up before you start giving doses of phenobarbital again</td>
<td></td>
</tr>
</tbody>
</table>
| Phenobarbital, chlorpromazine, haloperidol and benzodiazepines (diazepam, lorazepam, etc.) | **Phenobarbital** - drowsiness, unconsciousness (may last for many days), low temperature, low BP, shallow breathing, skin blisters between the fingers or on body/knees/ankles, no bowel sounds (means that the gut has stopped working and poisoning is serious)  
**Chlorpromazine and Haloperidol** - drowsiness, unconsciousness, low BP, low temperature, fast/irregular pulse, rigid/stiff limbs, abnormal eye movements  
**Benzodiazepines** - staggering walk, slurred speech, drowsiness, shallow breathing and unconsciousness |                                                                                                                                                                                                                                                                   |
| Carbamazepine, phenytoin & valporic acid      | **Carbamazepine** - dry mouth, aggressive behaviour, drowsiness, wide pupils, blurred vision, shallow breathing, irregular pulse, jerking movements, nausea, vomiting and diarrhoea  
**Phenytoin** - nausea, vomiting, drowsiness, slurred speech, blurred vision, the patient cannot walk properly  
**Valporic acid** - confusion, restlessness, shallow breathing, low BP and drowsiness                                                                                                                                 | Neither haemodialysis nor forced diuresis is useful for treating poisoning with any of these medicines                                                                                                     |
<table>
<thead>
<tr>
<th>Medicines</th>
<th>Signs and Symptoms</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dapsone</td>
<td>Signs may be delayed up to 24 hrs after a single dose: blue colour to skin and lips, restlessness, drowsiness, nausea, vomiting and severe belly pain, low BP, fast breathing, hallucinations, fits</td>
<td>Oxygen is not useful for treating cyanosis due to dapsone; dapsone poisoning is worse in patients who are deficient in G6PD</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Nausea, vomiting, drowsiness, low BP, irregular pulse, weakness, confusion and hallucinations</td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td>Anxiety, confusion, shaking, sweating without fever, fast pulse, blurred vision, drowsiness, fits</td>
<td></td>
</tr>
</tbody>
</table>
| Glyceryl trinitrate, hydralazine and beta-blockers | **GTN**- throbbing headache, warm face, dizziness, palpitations, low BP  
**Hydralazine** - warm skin, nausea and vomiting, headache, fast irregular pulse and low BP  
**Beta-blockers** - slow pulse, hallucinations, drowsiness, low BP, fits, unconsciousness, the heart and breathing may stop completely | For bronchospasm, give IV salbutamol or aminophylline                                                                                               |
<p>| Ibuprofen                       | Nausea, vomiting, headache, abdominal pain, shaking, drowsiness                                                                                                                                                                           | Very rarely kidney failure may occur after acute overdose                                                                                           |
| Iron containing medicines       | <strong>Within 6 hrs:</strong> vomiting, belly pain, diarrhoea, stools may be coloured black by the iron or may be dark because they contain blood.                                                                                         |                                                                                                                                                     |</p>
<table>
<thead>
<tr>
<th>Medicines</th>
<th>Signs and Symptoms</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid</td>
<td>Nausea, vomiting, stomach pain, large pupils, fever, fits, fat pulse, low BP, shallow breathing</td>
<td></td>
</tr>
<tr>
<td>Magnesium hydroxide, magnesium sulphate and senna</td>
<td>Diarrhoea, vomiting, stomach pain, blood in stools, low BP, fast pulse, unconsciousness</td>
<td>It is not necessary to make the patient vomit</td>
</tr>
<tr>
<td>Opiates</td>
<td>Very small pupils, drowsiness then unconsciousness, slow breathing, twitching, fits, low body temp, low BP, lung oedema; the patient may suddenly stop breathing and die</td>
<td></td>
</tr>
<tr>
<td>Oral contraceptives</td>
<td>Nausea and vomiting; girls over 4 years of age may have bleeding like a monthly period</td>
<td>There is no need to do anything</td>
</tr>
</tbody>
</table>
| Paracetamol                                   | **Within 24 hrs:** nausea, vomiting and belly pain  
**After 24-48 hrs:** pain on the right side of the belly  
**After 2-6 days:** yellow colour to skin and whites of eye showing that liver is damaged, vomiting, fast pulse, confusion, unconsciousness |                                                |
<table>
<thead>
<tr>
<th>Medicines</th>
<th>Signs and Symptoms</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| Penicillin and tetracyclines | **If the patient is not allergic:** nausea, vomiting, and diarrhoea.  
**If the patient is allergic:** itching, rash, difficulty in swallowing, swelling around the eyes, weakness, dizziness, chest pain, weak pulse, low BP, unconsciousness. In severe cases, encephalopathy may occur |                                                                         |
| Proguanil                  | Nausea, vomiting, diarrhoea, blood in the urine                                     |                                                                         |
| Rifampicin                | Orange-red colour in the skin, urine, faeces, sweat, tears, itching and swelling of the face, nausea, vomiting, belly pain, lethargy, fits, signs of liver and kidney damage |                                                                         |
| Salbutamol                | Excitement, agitation, hallucinations, fast pulse, shaking, fits, lung oedema       | Severe arrhythmias can be treated with slow IV injection of propranolol |
**Appendix 5: Equivalent analgesic dose**

When changing medicines, equi-analgesic doses must be considered. It is wise to start at a lower dose than that indicated in the table because there may be incomplete cross-tolerance between opioids. Titrate the dose upwards depending on assessment of pain control. Use breakthrough doses of opioid as well, if required, to establish adequate analgesia.

<table>
<thead>
<tr>
<th>Medicine (action at opioid receptors)</th>
<th>Dose equivalent to 10mg IM/SC morphine</th>
<th>Approx. duration of action</th>
<th>Active metabolite</th>
<th>Dose adjustment in renal impairment</th>
<th>Clinical use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine (agonist)</td>
<td>130mg IM; 200mg oral</td>
<td>3 - 4 hours</td>
<td>Morphine</td>
<td>Yes</td>
<td>Mild to moderate pain; do not exceed 60mg single dose</td>
</tr>
<tr>
<td>Morphine (agonist)</td>
<td>30mg oral</td>
<td>2 - 3 hours; controlled release 12 - 24 hours</td>
<td>Morphine 6 glucuronide (M6G), morphine 3 glucuronide (M3G)</td>
<td>Yes</td>
<td>M6G produces analgesia and some adverse effects; M3G is neuroexcitatory and can cause delirium</td>
</tr>
<tr>
<td>Pethidine (agonist)</td>
<td>75- 100mg IM/SC</td>
<td>2 - 3 hours</td>
<td>Norpethidine (CNS excitation)</td>
<td>Yes; contraindicated in renal failure</td>
<td>Use not recommended</td>
</tr>
<tr>
<td>Tramadol (agonist)</td>
<td>40 - 50mg IM;100mg oral</td>
<td>3 - 6 hours</td>
<td>Desmethyl tramadol</td>
<td>Yes</td>
<td>Moderate to severe pain</td>
</tr>
</tbody>
</table>
Appendix 6: Compounding formulae

Labelling instructions
Following details should be included in the label to be pasted on the container for extemporaneous liquid dosage forms:

1. Name and strength of the medicine
2. Expiry
3. “Shake well before use”

PART A: EXTERNAL PREPARATIONS

1. Magnesium sulphate paste

<table>
<thead>
<tr>
<th>Magnesium sulphate</th>
<th>75g</th>
</tr>
</thead>
<tbody>
<tr>
<td>White soft paraffin</td>
<td>25g</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
- Weigh magnesium sulphate and grind to a fine powder
- Weigh the white soft paraffin and gradually mix with the powder

Use: to draw pus from boils and infected wounds

2. Methyl salicylate (M/S) ointment

<table>
<thead>
<tr>
<th>Methyl salicylate</th>
<th>6ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>White soft paraffin</td>
<td>100mg</td>
</tr>
</tbody>
</table>

Expiry: 1 year

Directions:
- Weigh the white soft paraffin
- Measure methyl salicylate and add gradually to the paraffin

Use: to be applied by rubbing on the site of muscular pain

3. Potassium permanganate 1:1000 Solution

<table>
<thead>
<tr>
<th>Potassium permanganate</th>
<th>1g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>to 1000ml</td>
</tr>
</tbody>
</table>

Expiry: 10 days

Directions:
- Wash the bottle and mark for 1000ml
- Weigh the potassium permanganate and add 250ml of water to it; stir well
- Add to the bottle and use more water to dissolve the remaining crystals
- Add water to make up to 1000 ml

Use: Cleaning of ulcers and abscesses, wet dressing; for gargle or mouthwash, it should be diluted 1 in 4
4. Salicylic acid 40% ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salicylic Acid</td>
<td>40g</td>
</tr>
<tr>
<td>White Soft Paraffin</td>
<td>60g</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
1. Weigh the salicylic acid and grind to a fine powder
2. Weigh white soft paraffin and gradually mix with the powder using a spatula

Use: warts (apply to the warts only, 3 times a day; protect the skin around it with vaseline)

5. Sulphur 10% ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur</td>
<td>10g</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>90g</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
1. Weigh the sulphur powder and white soft paraffin
2. Gradually mix together using a spatula

Use: antiseptic; treatment of scabies

6. Tincture iodine

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodine</td>
<td>20g</td>
</tr>
<tr>
<td>Potassium iodide</td>
<td>24g</td>
</tr>
<tr>
<td>Spirit</td>
<td>500ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 1000ml</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
1. Wash the bottle and mark 1000ml on it
2. Measure the spirit
3. Weigh iodine and potassium iodide and mix with a little spirit
4. Add to the bottle and add the rest of the spirit
5. Add water up to 1000ml

Use: antiseptic

7. Gentamycin 0.3% ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamycin</td>
<td>300mg (7.5ml)</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>100g</td>
</tr>
</tbody>
</table>

Expiry: 14 days
Directions:
Measure gentamycin
Weigh the white soft paraffin and mix well with the gentamycin
Use: bed sores and other infected wounds which are resistant to other antibiotics

8. Whitfield’s ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzoic acid</td>
<td>12g</td>
</tr>
<tr>
<td>Salicylic acid</td>
<td>6g</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>182g</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
Weigh the benzoic acid and salicylic acid, grind together
Weigh the white soft paraffin and gradually mix with the powders
Use: fungal infections (ringworms); apply 2-3 times daily for at least 2 weeks

9. Zinc oxide 15% ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc oxide</td>
<td>15g</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>85g</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
Weigh the zinc oxide
Weigh the white soft paraffin and gradually mix with the powder
Use: to protect the skin and relieve skin irritation

10. Calamine lotion

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calamine</td>
<td>80g</td>
</tr>
<tr>
<td>Zinc oxide</td>
<td>80g</td>
</tr>
<tr>
<td>Water</td>
<td>to 1000ml</td>
</tr>
</tbody>
</table>

Expiry: 14 days

Directions:
Wash the bottle and mark 1000ml on it
Weigh the calamine and zinc oxide powder; mix well with a little water
Rinse the container several times with water and add the mixture to it
Add water to make up to 1000ml
Use: antipruritic (to relieve itching)
11. Calamine ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calamine</td>
<td>4g</td>
</tr>
<tr>
<td>Zinc oxide</td>
<td>3g</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>93g</td>
</tr>
</tbody>
</table>

**Expiry:** 6 months  
**Directions:**  
1. Weigh calamine and zinc oxide  
2. Weigh the white soft paraffin and gradually mix with the powders  
**Use:** antipruritic (to relieve itching)

12. Coal tar and salicylic acid ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal tar solution</td>
<td>6ml (7g)</td>
</tr>
<tr>
<td>Salicylic acid</td>
<td>2g</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>91g</td>
</tr>
</tbody>
</table>

**Expiry:** 6 months  
**Directions:**  
1. Weigh the salicylic acid and grind  
2. Weigh the white soft paraffin and gradually mix with the powder  
3. Measure coal tar solution and mix into the ointment  
**Use:** psoriasis and other scaly skin conditions

13. Salicylic acid 2% ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salicylic acid</td>
<td>2g</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>98g</td>
</tr>
</tbody>
</table>

**Expiry:** 6 months  
**Directions:**  
1. Weigh the salicylic acid and grind  
2. Weigh the white soft paraffin and gradually mix with the powder  
**Use:** to breakdown hard scaly skin

14. Boric acid 1% and zinc oxide ointment

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boric acid</td>
<td>2.4g</td>
</tr>
<tr>
<td>Zinc oxide</td>
<td>34g</td>
</tr>
<tr>
<td>White soft paraffin</td>
<td>206g</td>
</tr>
</tbody>
</table>

**Expiry:** 6 months  
**Directions:**  
1. Weigh boric acid and zinc oxide and mix well  
2. Weigh white soft paraffin and gradually mix with the powder
**Use:** mild antiseptic and soothing ointment

15. **Boroglycerine 10% paint**

<table>
<thead>
<tr>
<th>Component</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boric acid</td>
<td>10g</td>
</tr>
<tr>
<td>Glycerine</td>
<td>100ml</td>
</tr>
</tbody>
</table>

**Expiry:** 6 months

**Directions:**
- Clean and measure the bottle
- Weigh boric acid and grind to a fine powder. Gradually add glycerine, mix well
- Add to the bottle and rinse the mortar until all the glycerine is added

**Use:** mild antiseptic for mouth lesions

16. **Sodium bicarbonate 5% ear drops**

<table>
<thead>
<tr>
<th>Component</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium bicarbonate</td>
<td>5g</td>
</tr>
<tr>
<td>Glycerine</td>
<td>30ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

**Expiry:** 1 month

**Directions:**
- Wash the bottle and mark 100ml on it
- Weigh sodium bicarbonate and dissolve in a little hot water; add to the bottle
- Add glycerine
- Add water up to 100ml

**Use:** to soften wax; put into ear at night for 3 nights

17. **Compound podophylline paint 15%**

<table>
<thead>
<tr>
<th>Component</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Podophylline resin</td>
<td>15g</td>
</tr>
<tr>
<td>Compound benzoin tincture</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

**Expiry:** 6 months

**Directions:**
- Wash the bottle and mark 100ml on it
- Weigh the podophylline resin and mix well with a little compound benzoin tincture
- Add to the bottle and rinse the mortar several times with benzoin tincture
- Add benzoin tincture up to 100ml

**Use:** genital warts

**Cautions:** *podophylline is irritant to the skin and eyes; use with care. Apply only to the wart and protect the surrounding skin with vaseline*
18. Salicylic acid 2% ear drops

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salicylic acid</td>
<td>0.2g</td>
</tr>
<tr>
<td>Spirit</td>
<td>5ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 10ml</td>
</tr>
</tbody>
</table>

Expiry: 10 days

Directions:
1. Weigh the salicylic acid and grind in a mortar
2. Add spirit and then dissolve

Use: Dermatitis of the ear

19. Chlorine 0.1% solution

If using bleaching powder calculate the ratio of bleach to water by using the following formula:

\[
\frac{% \text{ chlorine desired}}{\text{No of gm of powder in 1 litre of water}} = \frac{X \times 1000}{\% \text{ chlorine in bleaching powder}}
\]

Example: To make 0.1% Chlorine solution from calcium hypochlorite powder containing 30% active Chlorine

\[
0.1\% / 30\% \times 1000 = 3.3
\]

Therefore, we must dissolve 3.3gms of chlorine hypochlorite (30%) in each litre of water used to make 0.1% chlorine solution

PART B: INTERNAL PREPARATIONS

Note: for internal medicines boiled and filtered water should be used

1. Lugol's iodine (aqueous iodine solution)

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodine</td>
<td>5g</td>
</tr>
<tr>
<td>Potassium iodide</td>
<td>10g</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
1. Clean and mark the bottle at 100ml
2. Weigh iodine and potassium iodide; grind and dissolve in a little water
3. Add to the bottle and add water to make it up to 100ml

Use: iodine supplements (1ml about 20 drops daily in water); use a glass bottle
2. Potassium chloride 10% mixture

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>200ml</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>100g</td>
</tr>
<tr>
<td>Chloroform spirit (5%)</td>
<td>50ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 1000ml</td>
</tr>
</tbody>
</table>

Expiry: 14 days

Directions:
- Wash the bottle and mark 1000ml on it
- Weigh KCl, grind and dissolve in a little water; add to the bottle
- Add chloroform spirit
- Add water to make up to 1000ml

Use: potassium supplement

3. Nystatin paste

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nystatin</td>
<td>4 tablets</td>
</tr>
<tr>
<td>Glycerine</td>
<td>10ml</td>
</tr>
</tbody>
</table>

Expiry: 6 months

Directions:
1. Crush the nystatin tablets and mix with 10ml hot glycerine
2. Add to the bottle; rinse the mortar with 10ml glycerine and add

Use: fungal infection of the mouth (1ml applied in the mouth 4 times a day, after meals)

4. Sugar syrup

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>5kg</td>
</tr>
<tr>
<td>Benzoic acid</td>
<td>6g</td>
</tr>
<tr>
<td>Water</td>
<td>to 6 litres</td>
</tr>
</tbody>
</table>

Expiry: 14 days

Directions:
1. Boil sugar in water until it dissolves
2. Add benzoic acid, as a preservative
3. Add water to make up to 6000ml

Use: flavouring agent, preservative, vehicle for medicines
5. Magnesium sulphate syrup

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium sulphate</td>
<td>500mg</td>
</tr>
<tr>
<td>Light magnesium carbonate</td>
<td>50mg</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>0.25ml</td>
</tr>
<tr>
<td>Syrup</td>
<td>0.5ml</td>
</tr>
<tr>
<td>Peppermint spirit</td>
<td>0.025ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 5ml</td>
</tr>
</tbody>
</table>

**Expiry:** 14 days

**Directions:**
1. Clean and mark the bottle
2. Weigh and dissolve magnesium sulphate in boiling water; add to the bottle
3. Weigh light magnesium carbonate and mix with water; add to the bottle
4. Measure the other liquids and add
5. Add water to make up to 5ml

**Use:** magnesium supplement

6. Deriphylline syrup

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deriphylline (300mg tab)</td>
<td>1 tablet</td>
</tr>
<tr>
<td>Syrup</td>
<td>40ml</td>
</tr>
<tr>
<td>Boiled and cooled water</td>
<td>to 150 ml</td>
</tr>
</tbody>
</table>

Each 5ml contains 10mg deriphylline

**Expiry:** 14 days

7. Digoxin syrup

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digoxin (0.25mg tab)</td>
<td>5 tablets</td>
</tr>
<tr>
<td>Syrup</td>
<td>5ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 25ml</td>
</tr>
</tbody>
</table>

Each ml contains 0.05mg digoxin

**Expiry:** 14 days

8. Furosemide syrup

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furosemide (40mg tab)</td>
<td>20 tablets</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>1 drop</td>
</tr>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 80ml</td>
</tr>
</tbody>
</table>

Each ml contains 10mg furosemide

**Expiry:** 14 days
9. Metoclopramide syrup

<table>
<thead>
<tr>
<th>Metoclopramide (10mg tab)</th>
<th>10 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>2 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each ml contains 1 mg metoclopramide

**Expiry:** 14 days

10. Paracetamol syrup

<table>
<thead>
<tr>
<th>Paracetamol (500mg)</th>
<th>200 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>400ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>20 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 1000ml</td>
</tr>
</tbody>
</table>

Each ml contains 100mg paracetamol

**Expiry:** 14 days

11. Promethazine syrup

<table>
<thead>
<tr>
<th>Promethazine (10mg)</th>
<th>250 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>150ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>10 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 500ml</td>
</tr>
</tbody>
</table>

Each ml contains 5mg promethazine

**Expiry:** 14 days

12. Isoniazid syrup

<table>
<thead>
<tr>
<th>Isoniazid (300mg tab)</th>
<th>2.5 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>2.5ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>2 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 10ml</td>
</tr>
</tbody>
</table>

Each ml contains 75mg isoniazid

**Expiry:** 14 days

<table>
<thead>
<tr>
<th>Isoniazid (100mg)</th>
<th>22.5 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>10ml</td>
</tr>
<tr>
<td>Chloroform Spirit</td>
<td>3 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 75ml</td>
</tr>
</tbody>
</table>

Each ml contains 30mg isoniazid

_National Essential Medicines Formulary 2016_
### 13. Calcium lactate syrup

<table>
<thead>
<tr>
<th>Calcium lactate (300mg)</th>
<th>14 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrups</td>
<td>30ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>3 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each 5ml contains 200mg calcium lactate

**Expiry:** 14 days

### 14. Zinc sulphate solution

<table>
<thead>
<tr>
<th>Zinc sulphate 20mg</th>
<th>10 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each 5ml contains 10mg elemental zinc

**Expiry:** 14 days

### 15. Warfarin syrup

<table>
<thead>
<tr>
<th>Warfarin (5mg tab)</th>
<th>1.5 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>10ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>2 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 75ml</td>
</tr>
</tbody>
</table>

Each 5ml contains 0.5mg warfarin

**Expiry:** 14 days

### 16. Rifampicin syrup

<table>
<thead>
<tr>
<th>Rifampicin (150mg)</th>
<th>3 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>10ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>3 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 75ml</td>
</tr>
</tbody>
</table>

Each 5ml contains 30mg rifampicin

**Expiry:** 14 days

### 17. Amoxicillin syrup

<table>
<thead>
<tr>
<th>Amoxicillin (250mg)</th>
<th>50 capsules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each ml contains 125mg amoxycillin

**Expiry:** 14 days
18. Phenytoin syrup

<table>
<thead>
<tr>
<th>Phenytoin (100mg)</th>
<th>50 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each ml contains 50mg phenytoin

**Expiry:** 14 days

19. Acetazolamide syrup

<table>
<thead>
<tr>
<th>Acetazolamide (250mg)</th>
<th>50 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Chloroform spirit</td>
<td>5 drops</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each ml contains 50mg acetazolamide

**Expiry:** 14 days

20. Cotrimoxazole syrup

<table>
<thead>
<tr>
<th>Cotrimoxazole (480mg)</th>
<th>50 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each ml contains 240mg cotrimoxazole

**Expiry:** 14 days

21. Erythromycin syrup

<table>
<thead>
<tr>
<th>Erythromycin (250mg)</th>
<th>50 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each ml contains 125mg erythromycin

**Expiry:** 14 days

22. Pyridoxine syrup

<table>
<thead>
<tr>
<th>Pyridoxine (25mg)</th>
<th>100 tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syrup</td>
<td>20ml</td>
</tr>
<tr>
<td>Water</td>
<td>to 100ml</td>
</tr>
</tbody>
</table>

Each ml contains 25mg pyridoxine

**Expiry:** 14 days

23. Cephalexin syrup

<table>
<thead>
<tr>
<th>Cephalexin (250mg)</th>
<th>50 capsules</th>
</tr>
</thead>
</table>
Syrup | 20ml
---|---
Water | to 100ml

Each ml contains 125mg cephalaxin

**Expiry:** 14 days

24. Phenobarbitone syrup

| Phenobarbitone (30mg) | 50 tablets
| Syrup | 20ml
| Water | to 100ml

Each ml contains 15mg phenobarbitone

**Expiry:** 14 days

25. Sodium citrate 0.3M solution

| Sodium citrate powder | 7.74 g
| Citric acid | 5g
| Syrup | 25ml
| Water | to 100ml

**Expiry:** 14 days

**Use:** Give 15ml stat prior to c-section and prevent acid aspiration syndrome.
Appendix 7: Medicines in pregnancy and lactation

Pregnancy categories of medicines (As per United States FDA categorization)

**Category A:** adequate and well controlled studies have failed to demonstrate a risk to fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters)

**Category B:** animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well controlled studies in pregnant women or animal studies have shown and adverse effect, but adequate and well controlled studies in pregnant women have failed to demonstrate a risk to fetus in any trimester

**Category C:** animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well controlled studies in human, but potential benefits may warrant use of the medicine in pregnant women despite potential risks

**Category D:** there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the medicine in pregnant women despite potential risks

**Category X:** studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risk involved in the use of medicine in pregnant women clearly out weight potential benefits

Table of medicines use in pregnancy and lactation

<table>
<thead>
<tr>
<th>MEDICINE</th>
<th>PREGNANCY CATEGORY</th>
<th>LACTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetazolamide</td>
<td>C</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Acetylcysteine</td>
<td>B</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Acyclovir (topical)</td>
<td>B</td>
<td>Excretion unknown; systemic exposure minimal after topical application</td>
</tr>
<tr>
<td>Acyclovir (oral)</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Adenosine</td>
<td>C</td>
<td>Potential for serious adverse reaction in nursing infants; decision to interrupt nursing after administration of adenosine or not should take into account the importance of medicine to mother</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Adrenaline</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Albendazole</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Allopurinol</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Aluminium hydroxide + Magnesium hydroxide</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Amikacin</td>
<td>D</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Amino acid solution</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>D</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>C</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Amlodipine</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Antihaemorrhoidal ointment</td>
<td>C</td>
<td>Insufficient systemic absorption to produce detectable quantities in human milk; use with caution</td>
</tr>
<tr>
<td>Antisnake venom serum</td>
<td>NA</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Coartem®</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Artemether</td>
<td>X</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Aspirin</td>
<td>C; D in 3rd trimester</td>
<td>Excreted in milk; decision should be made whether to discontinue feeding or medicine taking into account the importance of medicine to mother</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Atenolol</td>
<td>D</td>
<td>Excreted in milk; neonates born to mothers who are receiving atenolol at parturition or breast feeding may be at risk for hypoglycemia and bradycardia; use with caution</td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>X</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Atracurium besylate</td>
<td>C</td>
<td>Excretion in milk unknown; use with caution</td>
</tr>
<tr>
<td>Atropine sulphate</td>
<td>C</td>
<td>Excreted in breast; use with caution</td>
</tr>
<tr>
<td>Baclofen</td>
<td>C</td>
<td>Excreted in milk: not recommended</td>
</tr>
<tr>
<td>BCG vaccine</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Beclomethasone dipropionate</td>
<td>C</td>
<td>Excreted in milk; use only if benefits greatly out weight the risk</td>
</tr>
<tr>
<td>Benzathine benzylpenicillin</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Benzoic acid powder</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Benzylpenicillin</td>
<td>B</td>
<td>Excreted in milk</td>
</tr>
<tr>
<td>Betamethasone valerate (topical)</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Brimonidine eye drop</td>
<td>C</td>
<td>Excretion unknown; use only if the benefits out weight risk</td>
</tr>
<tr>
<td>Budesonide nasal spray</td>
<td>B</td>
<td>Excreted in milk; use only if the benefits out weight risk</td>
</tr>
<tr>
<td>Bupivacaine</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Caffiene Citrate</td>
<td>C; crosses placenta, can remain in fetus or neonates 64 to 300hrs</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Calcium carbonate with Vit D3</td>
<td>C</td>
<td>Excreted in milk; safe</td>
</tr>
<tr>
<td>Calcium gluconate</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Calcium lactate</td>
<td>C</td>
<td>Excreted in milk; safe</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>D</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Carbimazole</td>
<td>C</td>
<td>NA</td>
</tr>
<tr>
<td>Carvedilol</td>
<td>C; D in 2nd and 3rd trimester</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Cefixime</td>
<td>B</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Cephazolin</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Cetirizine</td>
<td>B</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Chloramphenicol (ophthalmic)</td>
<td>C</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>C</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Chloroquine</td>
<td>Uncategorized</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>C; exposure during 3rd trimester of pregnancy are at risk for EPS or withdrawal symptoms after delivery</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>--------------------------------------</td>
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<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ciprofloxacin (ophthalmic)</td>
<td>C</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>C</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Clarithromycin</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Clobazam</td>
<td>C</td>
<td>Excreted in milk; effect on infants unknown</td>
</tr>
<tr>
<td>Clobetasol propionate (topical)</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Clofazimine</td>
<td>C</td>
<td>Excreted in milk; do not administer to breast feeding women unless clearly indicated</td>
</tr>
<tr>
<td>Clomiphene</td>
<td>X</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Clonazepam</td>
<td>D</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Clonidine</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>B</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Clotrimazole (topical)</td>
<td>B (during 2nd and 3rd trimester; safety in 1st trimester is not established)</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Clotrimazole (as pessary)</td>
<td>B (during 2nd and 3rd trimester; safety in 1st trimester is not established)</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Codeine phosphate</td>
<td>C; D if used for prolong periods or near term</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Compound benzoin inhalation</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
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<tr>
<td>----------------------------------------------</td>
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<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Compound solution of sodium lactate</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Conjugated oestrogen</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole</td>
<td>D</td>
<td>Avoid; near term kernicterus in the new born.</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>C</td>
<td>Excretion in milk unknown; use with caution</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>D</td>
<td>Drug excreted in milk; donot feed</td>
</tr>
<tr>
<td>Cycloserine</td>
<td>C</td>
<td>Safe</td>
</tr>
<tr>
<td>Cyclosporin</td>
<td>C</td>
<td>Excreted in breast milk; do not feed</td>
</tr>
<tr>
<td>Dapsone</td>
<td>C</td>
<td>Excreted in breast milk; not safe</td>
</tr>
<tr>
<td>Deflazacort</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Dexamethasone 4mg tab</td>
<td>C</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Dextrose</td>
<td>A; maternal or fetal hyperglycemia may occur during labour and delivery; monitor</td>
<td>Excretion in milk unknown; use with caution</td>
</tr>
<tr>
<td>Diazepam</td>
<td>D</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Diclofenac Sodium</td>
<td>C; D if &gt;30 weeks after gestation</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Dicyclomine</td>
<td>B</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Digoxin</td>
<td>C</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Diltazem</td>
<td>C</td>
<td>Not safe; decision should be made either to discontinue medicine or feeding taking into account importance of medicine to mother</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
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<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dopamine</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Doxorubicin</td>
<td>D</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>D</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Efavirenz</td>
<td>D</td>
<td>Excretion unknown; donot feed</td>
</tr>
<tr>
<td>Enalapril</td>
<td>C: 1st trimester; D: 2nd and 3rd trimester</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Ephedrine</td>
<td>C</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Ergotamine tartrate + Caffeine</td>
<td>X</td>
<td>Excreted in breast milk; do not feed</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>B</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>B</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Ethinyloestradiol</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Ethionamide</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Etofylline +Theophylline</td>
<td>C</td>
<td>Excreted in breast milk; serious adverse effects in infants are unlikely unless mother has a toxic serum theophylline concentration</td>
</tr>
<tr>
<td>Fenofibrate 200mg tab</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Fentanyl citrate</td>
<td>C</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Ferrous sulphate + Folic acid</td>
<td>A</td>
<td>Excreted in breast milk; safe</td>
</tr>
<tr>
<td>Finasteride 5mg tab</td>
<td>X</td>
<td>NA</td>
</tr>
<tr>
<td>Fluconazole</td>
<td>D</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Fluconazole (topical)</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
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<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Fluorouracil</td>
<td>D</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Fluoxetine</td>
<td>C</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Fluphenazine</td>
<td>C</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Folic acid</td>
<td>A</td>
<td>Excreted in breast milk; safe</td>
</tr>
<tr>
<td>Furosemide</td>
<td>C: close monitoring of fetal growth required because of risk for higher fetal birth weights</td>
<td>Excreted in breast milk; use with caution, may inhibit lactation</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>C</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Gamma benzene hexachloride</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>D</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Glipizide</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Glycerin suppository</td>
<td>C</td>
<td>Excretion unknown; probably compatible with feeding</td>
</tr>
<tr>
<td>Griseofulvin</td>
<td>X</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>C: neonates exposed to antipsychotic drugs during 3rd trimester of pregnancy are at risk of extrapyramidal or withdrawal symptoms after delivery</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Halothane inhalation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
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<td>-----------------------------------------</td>
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<td>------------------------------------------------</td>
</tr>
<tr>
<td>Hepatitis B vaccine</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Homatropine (ophthalmic)</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Human Insulin (soluble)</td>
<td>B</td>
<td>Safe</td>
</tr>
<tr>
<td>Human Insulin (Isophane)</td>
<td>B</td>
<td>Safe</td>
</tr>
<tr>
<td>Human papiloma vaccine</td>
<td>B; not recommended for use in pregnant women</td>
<td>Excretion unknown; not recommended.</td>
</tr>
<tr>
<td>Human rabies immunoglobulin (HRIG)</td>
<td>C</td>
<td>No adverse events reported; may be excreted in breast milk</td>
</tr>
<tr>
<td>Hyaluronidase</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>C</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Hydrochlorothiazide</td>
<td>B</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Hydrocortisone (topical)</td>
<td>C</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Hydrocortisone sodium succinate</td>
<td>C</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Hydroxychloroquine</td>
<td>C</td>
<td>Excreted in breast milk; safe to feed</td>
</tr>
<tr>
<td>Ibandronate</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>C; D at ≥ 30 weeks gestation; may cause premature closure of ductus arteriosus</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>Indomethacin</td>
<td>C; D at ≥ 30 weeks gestation; may cause premature closure of ductus arteriosus.</td>
<td>Excreted in breast milk; not recommended</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
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</tr>
<tr>
<td>Iodine</td>
<td>Not studied</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Iohexol</td>
<td>B</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Enoxaparin</td>
<td>B</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Ipratropium respiratory</td>
<td>B</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Isoflurane inhalation</td>
<td>C</td>
<td>Use with caution</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>C</td>
<td>Excreted in milk; safe</td>
</tr>
<tr>
<td>Isoprenaline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isosorbide dinitrate</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Kanamycin</td>
<td>D</td>
<td>Usually compatible</td>
</tr>
<tr>
<td>Ketamine</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Ketorolac (ophthalmic)</td>
<td>C; D in 3rd trimester (may cause premature closure of ductus arteriosus)</td>
<td>Excreted in milk; contraindicated</td>
</tr>
<tr>
<td>Lactulose</td>
<td>B</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Lamivudine</td>
<td>C</td>
<td>HIV+ women are advised not to breast feed</td>
</tr>
<tr>
<td>Lamotrigine</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Levetiracetam</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Levodopa + Carbidopa</td>
<td>C</td>
<td>Inhibits lactation; use with caution</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>C</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Levonorgestrel + Ethinyloestradiol</td>
<td>X</td>
<td>Excreted in milk; lactation inhibited; use with caution</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
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</tr>
<tr>
<td>Levonorgestrel</td>
<td>X</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Lignocaine</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Lignocaine + Adrenaline</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Lopinavir with ritonavir</td>
<td>C; increased risk for congenital adrenal hyperplasia</td>
<td>Excretion unknown; HIV+ women should not breast feed anyway</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>D</td>
<td>Excreted in milk; not recommended.</td>
</tr>
<tr>
<td>Losartan</td>
<td>D; use during 2nd and 3rd trimester reduces renal function and increases fetal morbidity and death</td>
<td>Excretion unknown; not recommended.</td>
</tr>
<tr>
<td>Magnesium sulphate</td>
<td>D; fetal skeletal demineralization, hypocalcemia and hypermagnesia</td>
<td>Safe</td>
</tr>
<tr>
<td>Mannitol</td>
<td>C</td>
<td>Use with caution</td>
</tr>
<tr>
<td>Measles Rubella vaccine</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Medroxyprogesterone acetate</td>
<td>X</td>
<td>Safe</td>
</tr>
<tr>
<td>Mefenamic acid</td>
<td>C; D if used for prolong periods, or near term (premature closure of ductus arteriosus)</td>
<td>Excreted in milk; contraindicated</td>
</tr>
<tr>
<td>Metformin</td>
<td>B</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
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</tr>
<tr>
<td>Methotrexate</td>
<td>X</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Methoxsalen (topical)</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Methyl salicylate (topical)</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Methyldopa</td>
<td>B</td>
<td>Excreted in milk at low concentration; compatible with feeding</td>
</tr>
<tr>
<td>Methylergometrine</td>
<td>C</td>
<td>Excreted in milk; adverse effect on nursing infants; may inhibit lactation; not recommended or wait at least 12hrs after last dose to breastfeed</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>B</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Midazolam</td>
<td>D; should be avoided in 1st trimester due increased risk of congenital malformation</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Misoprostol</td>
<td>X</td>
<td>Excreted in breast milk; use with caution</td>
</tr>
<tr>
<td>Morphine</td>
<td>C; D if used near term</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Moxifloxacin (ophthalmic)</td>
<td>C</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Multivitamin</td>
<td>A</td>
<td>Safe</td>
</tr>
<tr>
<td>Mycophenolate mofetil</td>
<td>D</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>--------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Naloxone</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Neomycin + Polymixin + Bacitracin (topical)</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Neostigmine</td>
<td>Unknown; use with caution</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Nevirapine</td>
<td>C</td>
<td>HIV+ women are not advised to feed</td>
</tr>
<tr>
<td>Niclosamide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nifedipine</td>
<td>C</td>
<td>Excreted in milk; safe</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>B; but contraindicated in 3rd trimester</td>
<td>Excretion milk; do not feed</td>
</tr>
<tr>
<td>Nitrofurazone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Norethisterone</td>
<td>X</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Norfloxacin</td>
<td>C; crosses placenta</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Nystatin</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Olanzapine</td>
<td>C; exposure during 3rd trimester increases the risk for EPS or withdrawal symptoms after delivery</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Omeprazole</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Omnipaque</td>
<td>B</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>B</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Oral polio vaccine</td>
<td>B</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Oxybutynin</td>
<td>B</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Oxygen</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Oxymetazoline (ophthalmic)</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Oxytocin</td>
<td>X</td>
<td>May be excreted in milk, commencement of feeding should be delayed for at least one day when discontinued, use with caution</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>B; crosses placenta, safe to use in all stage of pregnancy for a short term</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Penicillin V</td>
<td>B</td>
<td>Excreted in milk; safe</td>
</tr>
<tr>
<td>Pentoxifylline</td>
<td>C</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Pethidine</td>
<td>B; use for prolonged periods or near term not established</td>
<td>Excreted in milk; not recommend</td>
</tr>
<tr>
<td>Phenobarbitone</td>
<td>D</td>
<td>Do not feed</td>
</tr>
<tr>
<td>Phenylephrine</td>
<td>C</td>
<td>Safe</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>D; prenatal exposure may increase the risk for congenital malformation and other adverse development outcomes; risk of fetal hydantion syndrome</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Phytomenadione</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pilocarpine (ophthalmic)</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td>C</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Podophyllum</td>
<td>X</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>C</td>
<td>NA</td>
</tr>
<tr>
<td>Potassium iodide</td>
<td>D</td>
<td>Excreted in milk; increased risk of thyroid suppression in fetus</td>
</tr>
<tr>
<td>Povidone Iodine Solution</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Pralidoxime</td>
<td>C</td>
<td>NA</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>C</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Procaine Benzylpenicillin</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Promethazone</td>
<td>C</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Propofol</td>
<td>B</td>
<td>Excreted in milk; effect on nursing infant unknown</td>
</tr>
<tr>
<td>Propranolol</td>
<td>C</td>
<td>Use is controversial; amount excreted in milk insignificant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protamine sulphate</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Pyrazinamide</td>
<td>C</td>
<td>Excreted in milk</td>
</tr>
<tr>
<td>Pyridoxine</td>
<td>A/C when exceeded RDA</td>
<td>Safe</td>
</tr>
</tbody>
</table>

National Essential Medicines Formulary 2016
<table>
<thead>
<tr>
<th><strong>MEDICINE</strong></th>
<th><strong>PREGNANCY CATEGORY</strong></th>
<th><strong>LACTATION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quetiapine</td>
<td>C; exposure during 3rd trimester are at risk for EPS or withdrawal symptom after delivery</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Quinine</td>
<td>X; 1st trimester</td>
<td>Excreted in milk</td>
</tr>
<tr>
<td>Ranitidine</td>
<td>B</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Retinol</td>
<td>A(oral); C (doses exceeding RDA); X (above 6000 units/day administered parenterally)</td>
<td>Excreted in milk; safe at RDA levels</td>
</tr>
<tr>
<td>Rifampicin</td>
<td>C; reported to cross placental barrier; congenital malformation</td>
<td>Excreted in milk</td>
</tr>
<tr>
<td>Risperidone</td>
<td>C; exposure during third trimester are at risk for EPS or withdrawal symptoms after delivery.</td>
<td>Excreted in milk; do not feed</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>C</td>
<td>NA</td>
</tr>
<tr>
<td>Salmeterol + Fluticasone MDI</td>
<td>C</td>
<td>Excretion unknown; use with caution (salmeterol plasma levels very low following inhalation</td>
</tr>
<tr>
<td>Salicylic acid powder</td>
<td>C</td>
<td>NA</td>
</tr>
<tr>
<td>Senna</td>
<td>C</td>
<td>Not excreted in milk; compatible</td>
</tr>
<tr>
<td>MEDICINE</td>
<td>PREGNANCY CATEGORY</td>
<td>LACTATION</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Silver sulphadiazine (topical)</td>
<td>C; X (near term)</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>A</td>
<td>Not excreted in milk; safe</td>
</tr>
<tr>
<td>Sodium citrate</td>
<td>C</td>
<td>NA</td>
</tr>
<tr>
<td>Sodium cromoglycate (ophthalmic)</td>
<td>B</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Sodium valproate</td>
<td>D; known to cause neural tube defects</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Spironolactone</td>
<td>C</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>D</td>
<td>Excreted in milk; compatible to feed</td>
</tr>
<tr>
<td>Sulphur sublime (topical)</td>
<td>C</td>
<td>Insufficient data; medicine absorbed through intact and broken skin</td>
</tr>
<tr>
<td>Suxamethonium</td>
<td>C</td>
<td>Excretion unknown; effect on nursing infant unknown</td>
</tr>
<tr>
<td>Tacrolimus</td>
<td>C</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Tamsulosin</td>
<td>B</td>
<td>NA</td>
</tr>
<tr>
<td>Tenofovir</td>
<td>B</td>
<td>HIV+ women are advised not to feed</td>
</tr>
<tr>
<td>Tetanus immunoglobulin</td>
<td>C</td>
<td>Excretion unknown; no adverse effect reported</td>
</tr>
<tr>
<td>Tetanus Diphtheria (Td)</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Thiamine</td>
<td>A; C(if &gt;RDA)</td>
<td>safe</td>
</tr>
<tr>
<td>Thiopental sodium</td>
<td>C</td>
<td>NA</td>
</tr>
<tr>
<td>Thyroxine</td>
<td>A</td>
<td>Excreted in milk; use with caution</td>
</tr>
<tr>
<td>Timolol maleate (ophthalmic)</td>
<td>C</td>
<td>Excreted in milk; do not feed</td>
</tr>
</tbody>
</table>

*National Essential Medicines Formulary 2016*
<table>
<thead>
<tr>
<th>MEDICINE</th>
<th>PREGNANCY CATEGORY</th>
<th>LACTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobramycin (ophthalmic)</td>
<td>B</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Tramadol</td>
<td>C</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Tranexamic acid</td>
<td>Not indicated in pregnant women</td>
<td></td>
</tr>
<tr>
<td>Triamcinolone acetonide</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Trihexyphenidyl 2mg tab.</td>
<td>C</td>
<td>No data, may inhibit lactation</td>
</tr>
<tr>
<td>Tropicamide</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Tropicamide + Phenytoin</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>C (injection); B (oral)</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>C</td>
<td>Excretion unknown; use with caution</td>
</tr>
<tr>
<td>Venlafaxine</td>
<td>C</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Verapamil</td>
<td>C</td>
<td>Excreted in milk; not recommended</td>
</tr>
<tr>
<td>Vincristine</td>
<td>D</td>
<td>Excretion unknown; do not feed</td>
</tr>
<tr>
<td>Visipaque</td>
<td>B</td>
<td>Excretion unknown; not recommended</td>
</tr>
<tr>
<td>Vitamin B complex</td>
<td>A (not exceeding RDA)</td>
<td>Safe</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>A; C (for doses exceeding RDA and for intranasal products)</td>
<td>Excreted in milk; safe</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>A; C (dose exceeding RDA)</td>
<td>Excreted in milk; safe</td>
</tr>
<tr>
<td>Warfarin</td>
<td>D (for women with</td>
<td>Because of potential serious adverse reactions,</td>
</tr>
</tbody>
</table>

National Essential Medicines Formulary 2016
<table>
<thead>
<tr>
<th>MEDICINE</th>
<th>PREGNANCY CATEGORY</th>
<th>LACTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>mechanical heart valves who are at risk for thromboembolism; X for other pregnant population</td>
<td></td>
<td>including bleeding in breast fed infant, consider developmental and health benefits breast feeding along with mother’s clinical need for therapy; monitor breast fed infant for bruising or bleeding</td>
</tr>
<tr>
<td>Zidovudine 300mg tab</td>
<td>C</td>
<td>HIV + women are advised not to feed</td>
</tr>
<tr>
<td>Zinc oxide powder 450g</td>
<td>C</td>
<td>Excretion unknown</td>
</tr>
<tr>
<td>Zinc sulphate 20mg tab</td>
<td>A</td>
<td>Excreted in milk; use with caution</td>
</tr>
</tbody>
</table>
## Appendix 8: Renal Impairment

### Table of medicines to be avoided or used with caution in renal impairment

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Degree of impairment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetzolamide</td>
<td>Mild</td>
<td>Avoid; metabolic acidosis</td>
</tr>
<tr>
<td>Acetylsalicylic Acid</td>
<td>Severe</td>
<td>Avoid; sodium and water retention; deterioration in renal function; increased risk of GI bleeding</td>
</tr>
<tr>
<td>Acyclovir</td>
<td>Mild</td>
<td>Reduce intravenous dose</td>
</tr>
<tr>
<td></td>
<td>Moderate to severe</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Allopurinol</td>
<td>Moderate to severe</td>
<td>100-200mg daily; increased toxicity; rashes 100mg on alternate days (max 100mg daily)</td>
</tr>
<tr>
<td>Aluminium Hydroxide</td>
<td>Severe</td>
<td>Aluminium is absorbed &amp; may accumulate</td>
</tr>
<tr>
<td>Amikacin</td>
<td>Mild</td>
<td>Reduce dose (individualized dosing)</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>Severe</td>
<td>Reduce dose; rashes more common</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Severe</td>
<td>Reduce dose; rashes more common</td>
</tr>
<tr>
<td>Artemether + Lumefantrine</td>
<td>Severe</td>
<td>Caution; monitor ECG &amp; plasma potassium</td>
</tr>
<tr>
<td>Atenolol</td>
<td>Moderate</td>
<td>Reduce dose (excreted unchanged); start with small dose; higher plasma conc. after oral administration</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>may reduce renal blood flow and adversely affect renal function</td>
</tr>
<tr>
<td>Baclofen</td>
<td>Severe</td>
<td>Avoid</td>
</tr>
<tr>
<td>Medicine</td>
<td>Degree of impairment</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Benzathine Benzylpenicillin</strong></td>
<td>Severe</td>
<td>Neurotoxicity-high doses may cause convulsions</td>
</tr>
<tr>
<td><strong>Benzyl Penicillin</strong></td>
<td>Severe</td>
<td>Max 6g daily; Neurotoxicity-high dose may cause convulsions</td>
</tr>
<tr>
<td><strong>Carbamazepine</strong></td>
<td>Severe</td>
<td>Manufacturer advises caution</td>
</tr>
<tr>
<td><strong>Chloramphenicol</strong></td>
<td>Severe</td>
<td>Avoid unless no alternative; dose-related depression of haematopoiesis</td>
</tr>
<tr>
<td><strong>Chloroquine</strong></td>
<td>Mild to moderate</td>
<td>Reduce dose in rheumatic disease; Reduce dose for malaria prophylaxis</td>
</tr>
<tr>
<td><strong>Chlorpromazine</strong></td>
<td>Severe</td>
<td>Start with small doses; Increased cerebral sensitivity; Monitor kidney function-dose dependent; increase in serum creatinine and urea during first few weeks may necessitate dose reduction</td>
</tr>
<tr>
<td><strong>Ciprofloxacin</strong></td>
<td>Moderate</td>
<td>Use half normal dose</td>
</tr>
<tr>
<td><strong>Cloxacillin</strong></td>
<td>Severe</td>
<td>Reduce dose</td>
</tr>
<tr>
<td><strong>Codeine</strong></td>
<td>Moderate to severe</td>
<td>Reduce dose or avoid; Increased and prolonged effect; Increased cerebral sensitivity</td>
</tr>
<tr>
<td><strong>Colchicine</strong></td>
<td>Moderate</td>
<td>Reduce dose</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>Avoid or reduce dose if no alternative</td>
</tr>
<tr>
<td><strong>Diazepam</strong></td>
<td>Severe</td>
<td>Start with small doses; Increased cerebral sensitivity</td>
</tr>
<tr>
<td>Medicine</td>
<td>Degree of impairment</td>
<td>Comment</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Mild</td>
<td>Reduce dose; toxicity increased by electrolyte disturbances</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>Mild</td>
<td>Use with caution; avoid excessive doses</td>
</tr>
<tr>
<td>Efavirenz</td>
<td>Severe</td>
<td>No information available; caution advised</td>
</tr>
<tr>
<td>Enalapril</td>
<td>Mild to moderate</td>
<td>Use with caution and monitor response; initial dose 2.5mg once daily</td>
</tr>
<tr>
<td>Ephedrine</td>
<td>Severe</td>
<td>Avoid; increased CNS toxicity</td>
</tr>
<tr>
<td>Ergotamine</td>
<td>Moderate</td>
<td>Avoid; nausea and vomiting; risk of renal vasoconstriction</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>Mild</td>
<td>Reduce dose; if cc less than 30 ml/min monitor plasma ethambutol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>concentration; optic nerve damage</td>
</tr>
<tr>
<td>Fluphenazine</td>
<td>Severe</td>
<td>Start with small dose; increase cerebral sensitivity</td>
</tr>
<tr>
<td>Furosemide</td>
<td>Moderate</td>
<td>May need high dose; deafness may follow rapid IV injection</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>Mild</td>
<td>Reduce dose; monitor plasma concentration</td>
</tr>
<tr>
<td>Glipizide</td>
<td>Mild to moderate</td>
<td>Increased risk of hypoglycaemia</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>Severe</td>
<td>Start with small doses; increased cerebral sensitivity</td>
</tr>
<tr>
<td>Heparin</td>
<td>Severe</td>
<td>Risk of bleeding increased</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>Mild</td>
<td>Reduce dose if cc less than 30 ml/minute</td>
</tr>
<tr>
<td>Hydrochlorothiazide</td>
<td>Moderate</td>
<td>Avoid; ineffective</td>
</tr>
<tr>
<td>Medicine</td>
<td>Degree of impairment</td>
<td>Comment</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>Mild</td>
<td>Use lowest effective dose and monitor renal function; sodium and water retention; deterioration in renal function possibly leading to renal failure</td>
</tr>
<tr>
<td>Iohexol</td>
<td>Moderate to Severe</td>
<td>Increased risk of nephrotoxicity; avoid dehydration</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>Severe</td>
<td>Maximum 200 mg daily for peripheral neuropathy</td>
</tr>
<tr>
<td>Lamivudine</td>
<td>Mild</td>
<td>Reduce dose; consult manufacturer’s literature</td>
</tr>
<tr>
<td>Levetiracetam</td>
<td>Severe</td>
<td>Max. 1g daily if cc less than 30ml/min</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Max. 1.5g daily if cc 30-50ml/min</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>Max. 2g daily if cc 50-80ml/min</td>
</tr>
<tr>
<td>Lopinavir + Ritonavir</td>
<td></td>
<td>Avoid oral solution due to propylene glycol content in severe impairment</td>
</tr>
<tr>
<td>Magnesium sulfate</td>
<td>Moderate</td>
<td>Avoid or reduce dose; increased risk of toxicity</td>
</tr>
<tr>
<td>Mannitol</td>
<td></td>
<td>Avoid unless test dose produces diuretic response</td>
</tr>
<tr>
<td>Metformin</td>
<td>Mild</td>
<td>Avoid; increased risk of lactic acidosis</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>Mild</td>
<td>Reduce dose; accumulates; nephrotoxic</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Avoid</td>
</tr>
<tr>
<td>Methyldopa</td>
<td>Moderate</td>
<td>Start with small dose; increased sensitivity to hypotensive and sedative effect</td>
</tr>
<tr>
<td>Medicine</td>
<td>Degree of impairment</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>Severe</td>
<td>Avoid or use small dose; increased risk of extrapyramidal reactions</td>
</tr>
<tr>
<td>Morphine</td>
<td>Moderate to severe</td>
<td>Reduce dose or avoid; increased and prolonged effect; increased cerebral sensitivity</td>
</tr>
<tr>
<td>Neostigmine</td>
<td>Moderate</td>
<td>May need dose reduction</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>Mild</td>
<td>Avoid; peripheral neuropathy; ineffective because of inadequate urine concentrations</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>Severe</td>
<td>Avoid large doses</td>
</tr>
<tr>
<td>Polyvidone-Iodine</td>
<td>Severe</td>
<td>Avoid regular application to inflamed or broken mucosa</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>Moderate</td>
<td>Avoid routine use; high risk of hyperkalaemia</td>
</tr>
<tr>
<td>Procainamide</td>
<td>Mild</td>
<td>Avoid or reduce dose</td>
</tr>
<tr>
<td>Procaine benzylpencillin</td>
<td>Severe</td>
<td>Neurotoxicity high doses may cause convulsions</td>
</tr>
<tr>
<td>Proguanil</td>
<td>Mild</td>
<td>100 mg once daily</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>50 mg on alternate days</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>50 mg once weekly; increased risk of haematological toxicity</td>
</tr>
<tr>
<td>Propranolol</td>
<td>Severe</td>
<td>start with small dose; higher plasma concentrations after oral administration; may reduce renal blood flow and adversely affect renal function</td>
</tr>
<tr>
<td>Quinine</td>
<td></td>
<td>Reduce parenteral maintenance dose for malaria treatment</td>
</tr>
<tr>
<td>Ranitidine</td>
<td>Severe</td>
<td>Use half normal dose; occasional risk of confusion</td>
</tr>
<tr>
<td>Medicine</td>
<td>Degree of impairment</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>Severe</td>
<td>Avoid</td>
</tr>
<tr>
<td>Sodium Valproate</td>
<td>Mild to Moderate</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Spironolactone</td>
<td>Mild</td>
<td>Monitor plasma K⁺; high risk of hyperkalaemia in renal impairment</td>
</tr>
<tr>
<td>Stavudine</td>
<td>Mild</td>
<td>20 mg twice daily (15 mg if body weight less than 60 kg)</td>
</tr>
<tr>
<td></td>
<td>Moderate to severe</td>
<td>20 mg once daily (15 mg if body wt less than 60 kg)</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>Mild</td>
<td>Reduce dose; monitor plasma concentration</td>
</tr>
<tr>
<td>Sulfamethoxazole + Trimethoprim</td>
<td>Mild</td>
<td>Use half normal dose if cc 15-30 ml/minute; avoid if cc less than 15 ml/minute and if plasma sulfamethoxazole concentration cannot be monitored</td>
</tr>
<tr>
<td>Tranexamic acid</td>
<td>Mild</td>
<td>Dose reduction required</td>
</tr>
<tr>
<td>Vencomycin</td>
<td>Mild</td>
<td>Reduce dose - monitor plasma vancomycin concentration and renal function regularly</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>Severe</td>
<td>Reduce dose; duration of block possibly prolonged</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Severe</td>
<td>Avoid</td>
</tr>
<tr>
<td>Zidovudine</td>
<td>Severe</td>
<td>Reduce dose; manufacturer advises oral dose of 300-400 mg daily in divided doses or intravenous dose of 1 mg/kg 3-4 times daily</td>
</tr>
</tbody>
</table>

National Essential Medicines Formulary 2016
## Appendix 9: Hepatic Impairment

### Table of Medicine to be avoided or used with caution in Hepatic impairment

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylsalicylic acid</td>
<td>Avoid - increased risk of gastrointestinal bleeding</td>
</tr>
<tr>
<td>Allopurinol</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Aluminium hydroxide</td>
<td>In patient with fluid retention, avoid antacids containing large amounts of sodium; also avoid those causing constipation (can precipitate coma)</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>Sedative effects increased (avoid in severe liver disease)</td>
</tr>
<tr>
<td>Artemether + Lumefantrine</td>
<td>Caution in severe impairment; monitor ECG and plasma potassium</td>
</tr>
<tr>
<td>Bupivacaine</td>
<td>Avoid (or reduce dose) in severe liver disease</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>Metabolism impaired in advanced liver disease</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>Reduce dose and monitor plasma concentration if both hepatic and severe renal impairment</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>Avoid if possible- increased risk of bone marrow depression; reduce dose and monitor plasma-chloramphenicol concentration</td>
</tr>
<tr>
<td>Chlorphenamine</td>
<td>Sedation inappropriate in severe liver disease - avoid</td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>Can precipitate coma; hepatotoxic</td>
</tr>
<tr>
<td>Ciclosporin</td>
<td>May need dose adjustment</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>Hepatic dysfunction reported</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>Cholestatic jaundice may occur up to several weeks after treatment has been stopped; administration for more than 2 weeks and increasing age are risk factor</td>
</tr>
<tr>
<td>Codeine</td>
<td>Avoid or reduce dose – may precipitate coma</td>
</tr>
<tr>
<td>Medicine</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Contraceptives, Oral</td>
<td>Avoid in active liver disease and if history of pruritus or cholestasis during pregnancy</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Can precipitate coma</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>Avoid (or use with caution)</td>
</tr>
<tr>
<td>Efavirenz</td>
<td>In milk to moderate liver disease, monitor liver function; avoid in severe hepatic impairment</td>
</tr>
<tr>
<td>Enalapril</td>
<td>Closely monitor patients with impaired liver function</td>
</tr>
<tr>
<td>Ergotamine</td>
<td>Avoid in severe liver disease – risk of toxicity increased</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>May cause idiosyncratic hepatotoxicity</td>
</tr>
<tr>
<td>Ethinylestradiol</td>
<td>Avoid, see also contraceptives, oral</td>
</tr>
<tr>
<td>Fluorouracil</td>
<td>Caution advised</td>
</tr>
<tr>
<td>Fluphenazine</td>
<td>Can precipitate coma; hepatotoxic</td>
</tr>
<tr>
<td>Furosemide</td>
<td>Hypokalaemia may precipitate coma (use potassium-sparing diuretic to prevent this); increased risk of hypomagnesaemia in alcoholic cirrhosis</td>
</tr>
<tr>
<td>Glipizide</td>
<td>As for glibenclamide</td>
</tr>
<tr>
<td>Griseofulvin</td>
<td>Avoid in severe liver disease</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>Can precipitate coma</td>
</tr>
<tr>
<td>Halothane</td>
<td>Avoid if history of unexplained pyrexia or jaundice following previous exposure to halothane</td>
</tr>
<tr>
<td>Heparin</td>
<td>Reduce dose in severe liver disease</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Hydrochlorothiazide</td>
<td>Avoid in severe liver disease; hypokalaemia may precipitate coma (potassium-sparing diuretic can prevent this); increased risk of hypomagnesaemia in alcoholic cirrhosis</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>Increased risk of gastrointestinal bleeding and can cause fluid retention; avoid in severe liver disease</td>
</tr>
<tr>
<td>Medicine</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Isoniazid</td>
<td>Use with caution; monitor liver function regularly and particularly frequently in the first 2 months</td>
</tr>
<tr>
<td>Levonorgestrel</td>
<td>Avoid in active liver disease and if history of pruritus or cholestatis during pregnancy</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>Avoid (or reduce dose) in severe liver disease</td>
</tr>
<tr>
<td>Lopinavir + Ritonavir</td>
<td>Avoid oral solution because of propyleneglycol content; use capsules with caution in mild to moderate hepatic impairment and avoid in severe impairment</td>
</tr>
<tr>
<td>Magnesium sulphate</td>
<td>Avoid in hepatic coma if risk of renal failure</td>
</tr>
<tr>
<td>Medroxyprogesterone</td>
<td>Avoid in active liver disease and if history of pruritus or cholestasis during pregnancy</td>
</tr>
<tr>
<td>Metformin</td>
<td>Withdraw if tissue hypoxia is likely</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>Dose-related toxicity-avoid in non-malignant conditions (for example, rheumatic disorders)</td>
</tr>
<tr>
<td>Methyldopa</td>
<td>Manufacturer advises caution in history of liver disease; avoid in active liver disease</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>In severe liver disease, reduce total daily dose to one-third and give once daily</td>
</tr>
<tr>
<td>Morphine</td>
<td>Avoid or reduce dose-may precipitate coma</td>
</tr>
<tr>
<td>Nevirapine</td>
<td>Caution in moderate hepatic impairment; avoid in severe hepatic impairment</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>Reduce dose</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>Cholestatic jaundice and chronic active hepatitis reported</td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>Hepatic dysfunction reported, reduce dose in severe liver disease</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Dose-related toxicity- avoid large doses</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>May precipitate coma</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Reduce dose to avoid toxicity</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>Adverse effects more common</td>
</tr>
<tr>
<td>Medicine</td>
<td>Comment</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Procainamide</td>
<td>Avoid reduce dose</td>
</tr>
<tr>
<td>Promethazine</td>
<td>Avoid – may precipitate coma in severe liver disease; hepatotoxic</td>
</tr>
<tr>
<td>Propranolol</td>
<td>Reduce oral dose</td>
</tr>
<tr>
<td>Pyrazinamide</td>
<td>Avoid-idiosyncratic hepatotoxicity more common</td>
</tr>
<tr>
<td>Ranitidine</td>
<td>Increased risk of confusion; reduce dose</td>
</tr>
<tr>
<td>Rifampicin</td>
<td>Impaired elimination; may be increased risk of hepatotoxicity; avoid or do not exceed 8 mg/kg daily</td>
</tr>
</tbody>
</table>
INDEX

2-FDC (RH), 56
3-FDC (HRE), 56
3-FDC (HRZ), 56
4-FDC (HRZE), 56
Acetazolamide, 115
Aciclovir, 113, 119
Adenosine, 80
Adrenaline, 28, 82, 91
Albendazole, 44
Allopurinol, 25
Amikacin, 50
Amino Acid Solution, 132
Amiodarone, 79
Amitriptylline, 31, 42
Amodipine, 77, 85
Amoxicillin, 45
Ampicillin, 46
Antacid, 93
Anti-haemorrhoidal Ointment, 96
Anthelmintics, 44
Anti-Snake Venom Serum, 15, 124
Artemether, 63
Artemether + Lumefantrine, 63
Aspirin, 23, 88, 139
Atenolol, 78, 85
Atorvastatin, 89
Atracurium besylate, 37
Atropine, 97, 116
Atropine Sulphate, 14
Baclofen, 36
Barium Sulphate, 133
BCG, 125
Becloamethasone dipropionate, 91
Benzathine Benzylpenicillin, 46
Benzylpenicillin (Penicillin G), 47
Beta-histine Dihydrochloride, 30
Betamethasone valerate, 121
Brimonidine, 114
Budesonide, 29
Bupivacaine, 19
Calamine, 119
Calcium Carbonate + Vitamin D3, 130
Calcium lactate, 129, 177
Calcium polystyrene sulfonate, 130
Carbipoda + Levodopa, 35
Carbimazole, 108
Carvediol, 88
Cefixime, 49
Cefotaxime, 49
Ceftriaxone, 48
Cephalexin, 48
Cephazolin, 48
Cetirizine, 27
Charcoal, 14
Chloramphenicol, 51, 112
Chlorine, 174
Chloroquine, 26, 62
Chlorpromazine, 38
Cinnarazine, 30
Ciprofloxacin, 50, 112
Clarithromycin, 53
Clobetasol propionate, 120
Clotrimazol, 55
Clomiphene, 102
Clonazepam, 32
Clopidogrel, 88
Clostrimazole, 61, 118
Cloxacillin, 47
Coal tar and salicylic acid ointment, 122
Codeine phosphate, 23
Codeine Phosphate, 93
Codeine Phosphate (CD), 98
Compound Benzoin, 93
Compound podophylline, 122
Compound Sodium Lactate, 131
Conjugated oestrogen, 105
Cyclopentolate, 117
Cyclophosphamide, 70
Cycloserine, 59
Cyclosporin (Neoral®), 68
Dapsone, 54, 64
Dexamethasone, 28, 102
Dextrose, 131
<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrose + Sodium Chloride</td>
<td>131</td>
</tr>
<tr>
<td>Diazepam</td>
<td>31, 43</td>
</tr>
<tr>
<td>Diclofenac Sodium</td>
<td>22</td>
</tr>
<tr>
<td>Dicyclomine</td>
<td>96</td>
</tr>
<tr>
<td>Digoxin</td>
<td>81, 87</td>
</tr>
<tr>
<td>Diltiazem</td>
<td>80</td>
</tr>
<tr>
<td>Dopamine</td>
<td>87</td>
</tr>
<tr>
<td>Dorzolamide</td>
<td>115</td>
</tr>
<tr>
<td>Doxorubicin</td>
<td>71</td>
</tr>
<tr>
<td>Doxycycline</td>
<td>52, 64</td>
</tr>
<tr>
<td>DTP- HepB- HipB Vaccine (Pentavalent)</td>
<td>126</td>
</tr>
<tr>
<td>Efavirenz (EFV/EFZ)</td>
<td>67</td>
</tr>
<tr>
<td>Enalapril</td>
<td>85, 86</td>
</tr>
<tr>
<td>Ephedrine</td>
<td>77</td>
</tr>
<tr>
<td>Ergotamine + Caffeine</td>
<td>30</td>
</tr>
<tr>
<td>Erythromycin stearate</td>
<td>53</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>57</td>
</tr>
<tr>
<td>Ethinyloestradiol</td>
<td>105</td>
</tr>
<tr>
<td>Ethionamide</td>
<td>58</td>
</tr>
<tr>
<td>Ethyl Chloride</td>
<td>21</td>
</tr>
<tr>
<td>Fenofibrate</td>
<td>89</td>
</tr>
<tr>
<td>Fentanyl citrate</td>
<td>25</td>
</tr>
<tr>
<td>Ferrous Sulphate + Folic Acid</td>
<td>72</td>
</tr>
<tr>
<td>Finasteride</td>
<td>100</td>
</tr>
<tr>
<td>Fluconazole</td>
<td>60, 113</td>
</tr>
<tr>
<td>Flurescin</td>
<td>133</td>
</tr>
<tr>
<td>Fluorouracil (5-FU)</td>
<td>71</td>
</tr>
<tr>
<td>Fluoxetine</td>
<td>42</td>
</tr>
<tr>
<td>Fluphenazine decanoate</td>
<td>40</td>
</tr>
<tr>
<td>Fluticasone + Salmeterol</td>
<td>92</td>
</tr>
<tr>
<td>Folic Acid</td>
<td>73</td>
</tr>
<tr>
<td>Frusemide</td>
<td>83, 99</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>35</td>
</tr>
<tr>
<td>Gamma Benzene</td>
<td>122</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>49</td>
</tr>
<tr>
<td>Gentamycin 0.3% Ointment</td>
<td>170</td>
</tr>
<tr>
<td>Glipizide</td>
<td>106</td>
</tr>
<tr>
<td>Glycerine</td>
<td>97, 123</td>
</tr>
<tr>
<td>Griseofulvin</td>
<td>60</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>39</td>
</tr>
<tr>
<td>Halothane</td>
<td>16</td>
</tr>
<tr>
<td>Hepatitis B vaccine</td>
<td>126</td>
</tr>
<tr>
<td>Homatropine</td>
<td>116</td>
</tr>
<tr>
<td>Human Insulin</td>
<td>106</td>
</tr>
</tbody>
</table>

**Human Rabies Immunoglobulin (HRIG):** 124

**Hyaluronidase:** 117

**Hydralazine:** 84

**Hydrochlorothiazide:** 82, 87, 99

**Hydrocortisone:** 120

**Hydrocortisone sodium succinate:** 101

**Hydroxychloroquine:** 27

**Hydroxyethyl starch:** 75

**Ibandronate:** 109

**Ibuprofen:** 21

**Indomethacin:** 22

**Iohexol:** 133

**Ipratropium:** 92

**Iron dextran:** 72

**Isoflurane:** 16

**Isoniazid:** 57

**Isoprenaline:** 81

**Isosorbide dinitrate:** 76

**Kanamycin:** 58

**Ketamine:** 18

**Ketorolac:** 118

**Lactulose:** 98

**Lamivudine (3TC):** 65

**Lamotrigine:** 34

**Levetiracetam:** 34

**Levofloxacin:** 59

**Levonorgestrel:** 103

**Levonorgestrel + Ethinyloestradiol:** 103

**Lignocaine:** 20, 79, 122

**Lopinavir/ Ritonavir (LPV/r):** 68

**Lorazepam:** 44

**Losartan:** 86

**Magnesium Sulphate:** 97, 109

**Magnesium Sulphate Paste:** 169

**Mannitol:** 99

**Medroxyprogesterone Acetate:** 105

**Medroxyprogesterone acetate depot:** 103

**Mefenamic Acid:** 23

**Metformin:** 107

**Methotrexate:** 26

**Methoxsalen:** 123

**Methyl Salicylate Rub (M/S Ointment):** 169

**Methylcellulose:** 117
Methyldopa, 84
Methylergometrine, 110
Methylsalicylate, 123
Metoclopramide, 95
Metoprolol, 79
Metronidazole, 61
Midazolam, 19
Misoprostol, 111
Morphine, 24
Moxifloxacin, 112
Multi-Electrolyte, 132
Multivitamin, 129
Mumps Measles Rubella Vaccine, 125
Mycophenolate mofetil (Cellcept®), 69
Naloxone, 15
Neosporin, 113
Neostigmine, 38
Nevirapine (NVP), 67
Niclosamide, 45
Nifedipine, 84
Nitrofurantoin, 53
Nitrofurazone, 119
Nitroglycerine (Glyceryl trinitrate), 76
Nitrous Oxide, 16
Norethisterone, 104
Norfloxacin, 51
Nystatin, 61
Olanzapine, 41
Omeprazole, 94
Ondansetron, 95
Oral Rehydration Salt (ORS), 98
Oxybutynin, 99
Oxygen, 17
Oxytocin, 110
Para-aminosalicylate sodium (PAS), 59
Penicillin V (Phenoxymethylpenicillin), 46
Penicillins, 45
Pentoxifylline, 90
Pethidine, 24
Phenobarbital, 32
Phenytoin, 77
Pilocarpine, 115
Pioglitazone, 107
Poliomyelitis, 125
Potassium Chloride, 130
Potassium Permanganate 1:1000 Solution (0.1, 169
Pralidoxime, 15
Prednisolone, 29, 101
Prednisolone acetate, 114
Primaquine, 62
Procaine Benzy1penicillin, 47
Promethazine, 27
Promethazine, 96
Propofol, 17
Propranolol, 31, 78, 82, 108
Protamine Sulfate, 74
Purified Vero-Cell Rabies Vaccine (PVRV), 126
Pyrazinamide, 58
Pyridoxine (Vitamin B6), 128
Quetiapine, 41
Quinine, 63
Ranitidine, 94
Retinol (Vitamin A, 128
Rifampicin, 55, 59
Risperidone, 40
Ritodrine, 111
Salbutamol, 91
Salicylic acid, 121
Salicylic Acid 40% Ointment, 170
Senna, 97
Silver Sulphadiazine, 119
Sodium amadotriazoate +meclum
amadotriazoate, 133
Sodium Bicarbonate, 132
Sodium Chloride, 132
Sodium citrate, 93
Sodium Cromoglicate, 118
Sodium valproate, 33
Spironolactone, 83, 87, 99
Streptomycin, 57
Sulphamethoxazole + Trimethoprim (Cotrimoxazole), 52
Sulphur 10% Ointment, 170
Suxamethonium, 38
Tacrolimus (Pangraf®), 68
Tamsulosin, 100
Tenofovir (TFV), 65, 66
Tenofovir + Lamivudine, 66, 67
Tetanus immunoglobulin, 123
Tetanus Toxoid, 125
Theophylline + Etophylline, 90
Thiamine, 128
Thiopental sodium, 18
Thyroxine, 108
Timolol maleate, 114
Tobramycin, 113
Tramadol hydrochloride, 25
Tranexamic acid, 75
Triamcinolone acetonide, 101, 120
Trihexyphenidyl, 36
Tropicamide, 116
Tropicamide + Phenylephrine, 117
Vancomycin, 54
Vecuronium, 37
Venlafaxine, 43
Verapamil, 78, 80
Vincristine, 70
Vit K (Phytomenadione), 74
Vitamin B Complex, 127
Vitamin B12 (Methylcobalamin), 73
Vitamin C, 128
Warfarin, 75
Water Based Gel, 123
Weak Iodine Solution, 109
Whitfield’s Ointment, 118, 171
Zidovudine (ZDV or AZT), 65
Zinc Oxide, 119
Zinc sulphate, 129