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# UNIT 1 ESSENTIAL DRUGS - 1

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## Structure

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Vaccines under UIP
  - 1.2.1 Contraindications and Precautions
  - 1.2.2 Adverse Reactions
- 1.3 Antacids and Antiulcer Drugs
- 1.4 Antibiotics and Topical Medications
- 1.5 Anti-pyretics and Analgesics
- 1.6 Anti-scabies Drugs
- 1.7 Antiemetics
- 1.8 Antispasmodics
- 1.9 Oral Rehydration Solutions (ORS)
- 1.10 Hematinics, Vitamins and Minerals
- 1.11 Diuretics
- 1.12 Sedatives and Antiepileptics
- 1.13 Expectorants and Mucolytics
- 1.14 Prenatal Steroids
- 1.15 Surface Anaesthesia for Repair of Minor Injury
- 1.16 Antibiotics for Eye, Ear Drops and Ointments
- 1.17 Drugs Used in Resuscitation and Life Support
- 1.18 Let Us Sum Up
- 1.19 References

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## 1.0 INTRODUCTION

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In this unit, we would discuss about essential drugs which play vital role in managing certain illness, prevention of certain vaccine preventable diseases and many more drugs which supplement to maintain health of an individual. As a mid level health care provider, it is important for you to know about the indications, doses, precautions while giving medications, their side effects. You will come across many patients who are on medications for chronic illness and taking drugs for a long period, you would be able to assess their conditions and help in follow up as and when required. This unit on essential drug would help you to review you previous knowledge and you will be more confident in dealing with the health related problems.

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## 1.1 OBJECTIVES

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After reading this unit, you will be able to:

- explain vaccines, route and doses and schedule of administering;

- list the common medications used for fever, pain, infections;
- enumerate drugs for scabies treatment;
- discuss anti-emetics and its indications;
- list antispasmodics and when to use;
- counsel the correct use of ORS and Hematinies, Vitamins and Minerals;
- explain how and when to use diuretics, antihypertensives and sedatives;
- enumerate appropriate use of drugs under National Health Programmes.

## 1.2 VACCINES UNDER UIP

Vaccine is biological preparation that provides active acquired immunity to a particular disease.

Vaccines, which are currently under Universal Immunisation Programme (UIP), are listed below:

S. no	Vaccine & its Presentation	Protection	Route	Number of Doses	Vaccination Schedule
1	<b>BCG</b> (Bacillus Calmette Guerin)- Lyophilized vaccine	Tuberculosis	Intra-dermal	1	At birth (upto 1 year if not given earlier)
2	<b>OPV</b> (Oral Polio Vaccine) Liquid vaccine	Poliomyelitis	Oral	5	Birth dose for institutional deliveries, Primary three doses at 6, 10 & 14 week and one booster dose at 16-24 month of age. Given orally
3	<b>Hepatitis B</b> Liquid vaccine	Hepatitis B	Intra-muscular	4	Birth dose (within 24 hours) for institution aldeliveries, Primary three doses at 6, 10 & 14 week.
4	<b>DPT</b> (Diphtheria, Pertussis and Tetanus Toxoid) Liquid vaccine	Diphtheria, Pertussis and Tetanus	Intra-muscular	5	Three doses at 6, 10 & 14 week and two booster dose at 16-24 month and 5-6 years of age
5	<b>Measles</b> Lyophilized vaccine	Measles	Sub-cutaneous	2	9-12 months of age and 2 <sup>nd</sup> dose at 16-24 months
6	<b>TT</b> (Tetanus Toxoid) – Liquid vaccine	Tetanus	Intra-muscular	2	10 years and 16 years of age. For pregnant woman, two doses given (one dose if

					previously vaccinated within 3 Year)
7	<b>JE</b> vaccination (in selected high disease burden districts) Lyophilized vaccine	Japanese Encephalitis (Brain fever)	Sub-cutaneous	2	9-12 months of age and 2 <sup>nd</sup> dose at 16-24 months (6 months after vaccination drive)
8	<b>Hib</b> (given as pentavalent containing Hib+DPT+ Hep B) (in 8 states) – Liquid vaccine	Hib pneumonia and Hib meningitis	Intra-muscular	3	6, 10 & 14 week of age

### 1.2.1 Contraindications and Precautions

Recipients of any vaccine should be observed for an adverse reaction.

- Anaphylaxis though rare, can occur and epinephrine (adrenaline) must always be immediately available whenever immunisation is given. If a serious adverse event (including anaphylaxis, collapse, shock, encephalitis, encephalopathy, or non-febrile convulsion) occurs following a dose of any vaccine, a subsequent dose should not be given.
- Immunisation should be postponed in acute illness, which may limit the response to immunisation, but minor infections without fever or systemic upset are not contraindications. A definite reaction to a preceding dose is a definite contraindication.

If alcohol or other disinfecting agent is used to wipe the injection site it must be allowed to evaporate, otherwise inactivation of a live vaccine may occur.

The intramuscular route must not be used in patients with bleeding disorders such as haemophilia or thrombocytopenia.

In the case of a severe reaction to Diphtheria, Pertussis, and Tetanus vaccine, the pertussis component should be omitted and the vaccination completed with Diphtheria and Tetanus vaccine.

Hypersensitivity may occur to antimicrobials preservatives or egg proteins in vaccine.

### 1.2.2 Adverse Reactions

Local reactions including inflammation and lymphangitis may occur.

Sterile abscess may develop at the injection site;

- Fever
- Headache
- Malaise starting a few hour after injection and lasting for 1–2 days may occur.
- Hypersensitivity reactions can occur including rarely, anaphylaxis.

**Check Your Progress 1**

1) Fill in the blanks:

- a) BCG is given for protection against \_\_\_\_\_.
- b) OPV is given as primary three doses at \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ weeks.
- c) Hepatitis B is administered through \_\_\_\_\_ route.
- d) Measles is administered through \_\_\_\_\_ route.
- e) Pentavalent contains \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

2) List the adverse effects of vaccination.

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**1.3 ANTACIDS AND ANTIULCER DRUGS**

These are drugs, which are used in the treatment of peptic ulcer (gastric and duodenal ulcer), gastroesophageal reflux disease and stress/drug induced ulcers. Antacids are basic substances, which is used to provide symptomatic relief and anti-ulcer drugs decreases the production of hydrochloric acid in stomach.

Medicine	Dose	Adverse Effects
<b>Antacids</b>		
Aluminium hydroxide + Magnesium hydroxide	10 to 20 ml 4 times a day (maximum: 80 ml in 24 hours)	Constipation, faecal impaction, stomach cramps, and hypophosphatemia
<b>Proton Pump Inhibitors</b>		
Omeprazole	Benign gastric and duodenal ulcers: 20 mg once daily for 4 weeks. Maintenance for recurrent duodenal ulcers: 20 mg once daily	Nausea, abdominal pain, constipation, flatulence, diarrhoea, arthralgia, decreased B12 absorption.
Pantoprazole	Benign gastric and duodenal ulcers: 40 mg once daily for 4 weeks. (administer 1 hour before food)	Nausea, abdominal pain, constipation, flatulence, diarrhoea, arthralgia, decreased B12 absorption.
<b>H<sub>2</sub> blockers</b>		
Ranitidine	Benign gastric and duodenal ulceration:	Diarrhoea; headache; dizziness; rash; tiredness; acute

	150 mg twice daily or 300 mg at night for 4 to 8 weeks, up to 6 weeks in chronic episodic dyspepsia.	pancreatitis.
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## 1.4 ANTIBIOTICS AND TOPICAL MEDICATIONS

Antibiotics are substances that kill or inhibit the growth of microbes (bacteria, viruses, fungi, protozoa, helminths).

Based on action on the type of organism, these are classified as anti-bacterial, anti-viral, anti-fungal, and anti-protozoal and anti-helminths.

These drugs elicit their action by targeting one of the components of the microbe rather than host cell. According to the mechanism of action, the antibiotics are classified as:

- 1) Inhibit cell wall synthesis: Penicillin, Cephalosporin, Cycloserine, Vancomycin and Bacitracin.
- 2) Cause leakage from cell membranes:
  - a) Poly-peptides-Polymyxins, Colistin, Bacitracin,
  - b) Polyenes-Amphotericin B, Nystatin, Hamycin.
3. Inhibit protein synthesis: Tetracycline, Chloramphenicol, Erythromycin, Clindamycin, and Linezolid.
4. Cause misreading of m-RNA code and affect cell permeability: Aminoglycosides-Streptomycin, Gentamycin, etc.
5. Inhibit DNA gyrase: Fluoroquinolones–Ciprofloxacin, ofloxacin, norfloxacin, moxifloxacin.
6. Interfere with DNA function: Rifampin, Metronidazole.
7. Interfere with DNA synthesis: Acyclovir, Zidovudine.
8. Interfere with intermediary metabolism: Sulfonamides, Sulfones, PAS, Trimethoprim, Pyrimethamine, and Ethambutol

Antibiotic resistance is the worldwide health problem. The important reasons could be:

- 1) overuse of antibiotics in viral infections
- 2) misuse of antibiotics in infections (underdosing, inappropriate duration) hence judicious use of antibiotics is of paramount importance.

Let us now discuss the important antibiotics as explained below:

Medicine	Indications	Dose	Adverse Effects
<b>Sulfonamides</b>			
<b>Cotrimoxazole</b> fixed drug dose combination of sulfamethoxazole (SMZ) and trime-	<ul style="list-style-type: none"> <li>• Urinary-tract infections</li> <li>• Respiratory-tract infections including bronchitis,</li> </ul>	<b>Adult:</b> 1 to 2 tablet twice daily for 7-14 days (160 + 800 mg).	<ul style="list-style-type: none"> <li>• Nausea,</li> <li>• vomiting,</li> <li>• stomatitis, headache and rashes</li> </ul>

Medicine	Indications	Dose	Adverse Effects
thoprim (TMP) given in the dose ratio of 5:1	pneumonia, <ul style="list-style-type: none"> <li>• Infections in cystic fibrosis;</li> <li>• Otitis media;</li> <li>• Skin infections;</li> <li>• Pneumocystis carinii pneumonia</li> </ul>	<b>Child:</b> Suspension 5 ml twice daily (40 + 200 mg); infant 2.5 ml.	
<b>Beta-lactams</b>			
<b>Ampicillin</b>	Active against both gram positive & gram negative bacteria causing Otitis media; respiratory tract and urinary tract infections; mastoiditis; gynaecological infections; septicemia; peritonitis; endocarditis; meningitis; cholecystitis; osteomyelitis; respiratory tract infection.	<b>Oral (Adults)</b> - 250 mg to 1g every 6 h at least 30 min before food. Urinary tract infection <b>Adults:</b> 500 mg every 8 h. Administer on an empty stomach with a full glass of water (i.e., 30 minutes prior to or 2 hours after meals) to increase total absorption	Nausea and vomiting, diarrhoea; rashes, high fever (hypersensitivity or toxic response may be serious reaction, discontinue treatment); hypersensitivity reactions including urticaria, angioedema
<b>Amoxicillin</b>	Active against both gram positive & gram negative bacteria causing Urinary tract infections, upper respiratory tract infections, bronchitis; pneumonia; otitis media; dental abscess; osteomyelitis; Lyme's disease in children; endocarditis prophylaxis	<b>Adults:</b> 250 mg every 8 h, double in severe infections. Otitis media: 1g every 8 h. Enteric fever: 2 to 4g daily in divided doses for 14 to 21 days. <b>Child upto 10 years:</b> 125 mg every 8 h, double in severe infections. Otitis media: 40 mg/kg body weight daily in	Nausea and vomiting, diarrhoea, rashes; hypersensitivity reactions

Medicine	Indications	Dose	Adverse Effects
		three divided doses. Enteric fever: 50 to 100 mg/kg body weight in three divided doses for 14 to 21 days.	
<b>Aminoglycosides</b>			
<b>Gentamicin</b>	Active against gram-negative bacteria. Pneumonia; cholecystitis; peritonitis; septicemia; acute pyelonephritis; prostatitis; skin infections; pelvic inflammatory disease; endocarditis; meningitis; listeriosis; tularaemia; brucellosis; plague; surgical prophylaxis; ocular bacterial infection.	Intravenous infusion - Once daily dose regime; 5 to 7 mg/kg body weight, then adjust as per serum gentamicin concentration. Multiple daily dose regimens: 3mg/kg body-weight divided into 8 hourly doses. Child - 2 weeks to 12 years; 2 mg/kg body weight 8 hourly.	Vestibular and auditory damage, nephrotoxicity, rarely hypomagnesaemia on prolonged therapy; antibiotic-associated colitis, also nausea, vomiting, rash.
<b>Fluroquinolones</b>			
<b>Ciprofloxacin</b>	Active against aerobic gram negative bacilli. <b>Gastroenteritis</b> - including cholera, shigellosis, travellers' diarrhoea, campylobacter and salmonella enteritis; typhoid;  Gonorrhoea; chancroid; legionnaires' disease; meningitis (including meningococcal meningitis prophylaxis);  Respiratory-tract	<b>Oral Adults:</b> Urinary tract infection, respiratory tract infection: 250 to 500 mg, twice daily. <b>Severe</b> respiratory tract infections: upto 750 mg twice daily <b>Chronic prostatitis:</b> 500 mg twice daily for 28 days. <b>Gonorrhoea:</b> 500 mg as a	Nausea, vomiting, dyspepsia, abdominal pain, flatulence, diarrhoea dysphagia, tremor, hyperglycemia, headache, dizziness, sleep disorders, rash and pruritus. <b>Contraindications</b> Epilepsy and hypersensitivity to quinolones.



Medicine	Indications	Dose	Adverse Effects
	<p>infections including pseudomonal infections in cystic fibrosis, but not pneumococcal pneumonia;</p> <p>Urinary-tract infections; bone and joint infections; septicemia; anthrax;</p> <p>Skin infections; prophylaxis in surgery</p>	<p>single dose.</p> <p><b>Children:</b> Not recommended.</p> <p>May administer with food to minimise GI upset; avoid antacid use</p>	
<b>Norfloxacin</b>	<p>Urinary and genital tract infections, bacterial diarrhoeas. It is not effective against upper respiratory infections</p>	<p>Urinary Tract Infection: 200 to 400 mg daily preferably in the morning. Increase if necessary in upper urinary tract infection to 400 mg twice daily</p> <p>Uncomplicated genital Chlamydia infections, non-gonococcal urethritis: 400 mg daily in single dose for 7 days or divided doses for 7 days.</p>	<p>Nausea, vomiting, dyspepsia, abdominal pain, diarrhoea (rarely, antibiotic-associated colitis), headache, dizziness.</p>
<b>Macrolides</b>			
<b>Azithromycin</b>	<p>Community acquired Pneumonia, Uncomplicated genital chlamydial infections and trachoma</p>	<p><b>Adults:</b> 500 mg once daily for 3 days or 500 mg on first day then 250 mg once daily for 4 days. (Take on an empty stomach 1 hr before or 2 hr after meals)</p>	<p>Renal impairment; exacerbation of symptoms of myasthenia gravis; impaired hepatic functions.</p>



Medicine	Indications	Dose	Adverse Effects
<b>Tetracycline</b>			
<b>Doxycycline</b>	Respiratory tract infections, including Pneumonia and Chronic bronchitis; Urinary-tract infections; syphilis; chlamydia, mycoplasma and Rickettsia; Prostatitis; Lymphogranuloma venereum; Pelvic Inflammatory Disease (PID)	<p><b>Severe</b> infections: 200 mg daily. Early syphilis: 100 mg twice daily for 14 days.</p> <p><b>Latent</b> syphilis: 200 mg twice daily for 28 days.</p> <p><b>Uncomplicated genital Chlamydia</b>, non-gonococcal urethritis: 100 mg twice daily for 7 days.</p> <p><b>Children:</b> Only if alternate antibacterial cannot be given 5 mg/kg body weight in two divided doses.</p>	<p>Hypotension, pericarditis, angioneurotic oedema, dyspnoea, serum sickness, peripheral oedema, tachycardia, urticaria, haemolytic anaemia, thrombocytopenia, neutropenia, porphyria, eosinophilia, blurring of vision, scotomata, diplopia, tinnitus, abdominal pain, jaundice, pancreatitis, rashes, exfoliative dermatitis, photo-onycholysis, photosensitivity, arthralgia, myalgia, vaginitis.</p> <p><b>Contraindications</b> Pregnancy and children; porphyria; systemic lupus erythematosus</p>
<b>Nitrofurantoin</b>	Urinary-tract infections; cystitis.	<p><b>Adults:</b> 50 mg every 6 h with food for 3-7 days.</p> <p><b>Children:</b> over 3 months: 3 mg/kg body weight daily in four divided doses. Severe chronic recurrent infections: 100 mg every 6 h with food for 7 days, discontinue or reduce dosage in case of nausea.</p>	<p>Dose-related gastrointestinal disorders, nausea; hypersensitivity reactions including urticaria, rash, sialadenitis, pruritus, angioedema; anaphylaxis reported; rarely, cholestatic jaundice, hepatitis.</p>

### Topical Medications

Topical antibiotics are used to treat skin infections such as impetigo, folliculitis, furunculi, cellulitis and erysipelas. They are usually caused by streptococcal and staphylococcal infections.

In all skin infections, an important part of treatment is cleansing and thorough drying. Washing with soap and water will often help to prevent infection. Light localised infections can often be treated effectively with an antiseptic solution such as chlorhexidine.

Medicine	Indication	Dose & Administration	Adverse Effects
<b>Topical antibiotics</b>			
<b>Silver Sulfadiazine</b> Availability: Cream: 1%w/w	Prophylaxis and treatment of infection in burns	Apply with a sterile-gloved hand. Burned area should be covered with cream at all times; reapply to areas where cream has been removed by patient activity. Dressings may be used if necessary	Allergic reactions include rashes; burning and itching; sulfonamide induced systemic toxicity; transient leucopenia
<b>Neomycin + Bacitracin</b> Cream: 5, 10 and 15g (Aluminium tubes).	Superficial bacterial infections of the skin due to staphylococci and streptococci.	Adults and children- Bacterial skin infections over 2 years: apply as a thin layer 3 times daily.	Sensitisation; especially to neomycin; causing reddening and scaling; systemic absorption leading to irreversible ototoxicity; particularly in children; elderly; and in renal impairment; pregnancy
<b>Gentian Violet</b> Availability: Solution: 0.5% Tincture: 0.5%.	Superficial fungal and bacterial infections	Skin infections: apply 2 or 3 times daily for 2 to 3 days.	Redness, swelling; irritation; allergic reaction.
<b>Topical antifungal</b>			
<b>Benzoic Acid + Salicylic Acid</b> Cream: 25 and 50 g (Aluminium tubes, jars).	Mild dermatophyte infections, particularly caused by <i>Tinea pedis</i> and <i>Tinea corporis</i> .	Fungal skin infections: apply twice daily until the infected skin is shed (usually at least 4 weeks).	Occasionally localised; mild inflammatory reaction; swelling of face, lips and tongue; difficulty in breathing.

Medicine	Indication	Dose & Administration	Adverse Effects
		<p>Gently rinse the affected skin with saline or water before treating it with this medicine. Pat the skin dry with a clean towel or cotton gauze. Apply a generous amount of the medicine and spread it evenly to form a 1/8-inch thick layer over the treated area. It is best to apply this medicine to your skin with a clean cotton swab. Throw the swab away after one use. You may also apply the medicine to a cotton gauze pad and then place the gauze over your skin.</p>	
<p><b>Miconazole</b>            Cream: 10 and 15g (2% w/w)            Gel: 2% w/w.</p>	<p>Superficial fungal infections due to dermatophytes and yeasts, and secondary infections caused by Gram-positive cocci including ringworm, intertrigo, candida napkin rash, paronychia, and pityriasisversicolor.</p>	<p>Skin infections: apply twice daily to clean dry lesions, continuing for at least 10 days after the condition has cleared.            Nail infections: apply 1 to 2 times daily.</p>	<p>Occasional local irritation and burning; also contact dermatitis, discontinue if sensitisation occurs.</p>

Medicine	Indication	Dose & Administration	Adverse Effects
<b>Topical steroids</b>			
<b>Betamethasone</b> Cream: 0.1% w/w Ointment: 0.1% w/w	Atopic dermatitis, Seborrheic dermatitis, Lichen simplex chronicus, Later phase of allergic contact dermatitis, Later phase of irritant dermatitis, Nummular eczematous dermatitis, Stasis dermatitis, Psoriasis, especially of genitalia and face.	Adults and children- Inflammatory skin conditions, over 2 years of age: Apply small quantity to the affected area 1 to 2 times daily until improvement occurs, then less frequently.	Skin atrophy, telangiectasia, erythema, and hypertrichosis
<b>Hydrocortisone</b> Cream: 10 and 15g (1% w/w)		Inflammatory skin conditions- Apply a small quantity to the affected area 1 to 2 times daily until improvement occurs, then less frequently	
<b>Emmolients</b>			
<b>Calamine</b> Lotion 50 and 100 ml (8% w/w) Cream 1g.	Mild pruritus.	Mild pruritus: apply liberally 3 to 4 times daily.	

Penicillin is an antibiotic which kills bacteria. It is also the world's first wonder drug. It can be given in injection and oral forms.

**Uses:** Penicillin can be used for the cure of a Streptococcal Infection, Upper Respiratory Tract Infection, Skin or Soft Tissue Infection, Tonsillitis/Pharyngitis, Rheumatic Fever Prophylaxis, Otitis Media, Pneumonia.

**Precautions:** Persons who are allergic to any penicillin antibiotic, such as amoxicillin, ampicillin, carbenicillin, dicloxacillin or oxacillin should not take it.

Hypersensitivity reactions with penicillin are more common and more serious with intravenous therapy, but have also been reported with oral therapy. An initial sensitising exposure is required. Hypersensitivity side effects include skin eruptions, pruritus, urticaria, laryngeal oedema, fever, eosinophilia, hypersensitivity myocarditis, serum sickness- like reactions (chills, fever, oedema, arthralgia, and prostration), severe or fatal anaphylaxis, shock, and death.

**Side Effects:** The major side effects include diarrhoea, sore mouth or tongue vaginal itching and discharge, white patches in the mouth and/or on the tongue.

**Remember:**

Penicillin is rarely used now a days.

## 1.5 ANTI-PYRETICS AND ANALGESICS

Analgesics are drugs used to relieve/reduce pain and antipyretics are used to reduce elevated body temperature.

**Mechanism of action of non-opioid analgesics:** Prostaglandins are autacoids responsible for inflammation, pain and fever. Cyclooxygenase (COX 1& 2) is the enzyme responsible for the production of prostaglandins. Inhibition of COX activity leads to antipyretic, analgesic and anti-inflammatory activity. These are also commonly referred as non steroidal anti-inflammatory drugs.

### Indications

Mild to moderate pain including dysmenorrhoeal pain, headaches, pain relief in osteoarthritis, rheumatoid arthritis, autoimmune arthritis and soft tissue lesions, pyrexia including post-immunisation pyrexia, acute migraine attack.

### Adverse effects

Gastrointestinal: Gastric irritation, erosions, peptic ulceration, gastric bleeding/perforation, oesophagitis.

Hepatic: Raised transaminases, hepatic failure (rare)

CNS: Headache, mental confusion, behavioural disturbances, seizure precipitation

Haematological: Bleeding, thrombocytopenia, haemolytic anaemia, agranulocytosis

Others: Asthma exacerbation, nasal polyposis, skin rashes, pruritus, angioedema

Commonly used non steroidal anti-inflammatory drugs (NSAIDs) and their doses are as given below:

Medicine	Dose	Adverse Effects
<b>Paracetamol</b>	<p><b>Oral</b>            Adults- 0.5 to 1g every 4 to 6 h (max. 4g, max 2g in alcoholics per day).            Children up to 2 months - for post-immunisation pyrexia: 60 mg.            3 months to 1 year: 60 to 120 mg every 4 to 6 h.            1 to 5 years: 120 to 250 mg every 4 to 6 h.            6 to 12 years: 250 to 500 mg every 4 to 6 h.</p> <p><b>Intramuscular injection</b>            Adults- 250 mg every 4 to 6 h or as required.</p>	Nausea and rashes rarely occur
<b>Aspirin(acetyl</b>	Adults: Analgesic and	Nausea, vomiting,

Medicine	Dose	Adverse Effects
<b>salicylic acid)</b>	antipyretic including migraine attacks: 0.3 to 0.9 g, 3 to 4 times a day (max. 4 g daily). Acute rheumatic fever: 4 to 6 g or 75 to 100 mg/kg daily in divided doses. Anti-platelet: 75-325 mg/day Children under 16 years: not recommended (can cause Reye's syndrome).	epigastric distress, peptic ulcer, salicylism-(dizziness, tinnitus, vertigo, reversible impairment of hearing and vision, excitement and mental confusion, hyperventilation and electrolyte imbalance).
<b>Diclofenac</b>	Oral: 100 to 150 mg daily in 2 to 3 divided doses, (max 150 mg/day) maintenance by 50 to 100 mg in divided doses. Intramuscular injection: 75 mg, 2 to 3 times daily. Topically: Adults- Apply 1% w/w gel on to affected area 3 to 4 times daily. Instill to eye post-operative ocular inflammation: Adult- as sodium (1% w/v), 4 times daily starting 24 h after surgery for up to 28 days. Rectal: Post-operative pain. Adults- 75 to 150 mg daily in divided doses (maximum 150 mg/day, inclusive of diclofenac administered through other routes). Children - 6 to 12 year: 1 to 2 mg/kg/day in divided doses for maximum of 4 days.	Epigastric pain, nausea, headache, dizziness, rashes.
<b>Ibuprofen</b>	Adults and children over 12 years- initially 300 to 400 mg 3 to 4 times daily, increase if necessary(max. 2.4g daily), maintenance dose of 0.6 to 1.2g daily may be adequate. Infants or children over 3 months- 5-10 mg/kg, 3 to 4 times/day, maximum daily dose: 40 mg/kg/day.	Gastric discomfort, nausea and vomiting, headache, dizziness, blurring of vision, tinnitus and depression can occur.

### Check Your Progress 2

1) List antacids used to decrease production of hydrochloric acid in stomach.

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2) Name antibiotics indicated for treating UTIs.

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3) Name the antibiotics indicated for treating Respiratory Tract Infections (RTIs).

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4) List the indications for using anti-pyretics and analgesics.

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5) List the adverse effects of anti-pyretics and analgesics.

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## 1.6 ANTI-SCABIES DRUGS

These are drugs, which are active against scabies. Scabies is an infestation of the skin by the mite *Sarcoptes scabiei* that results in an intensely pruritic eruption with a characteristic distribution pattern.

Name	Dose	Adverse Effects
Benzyl benzoate Availability <b>Lotion</b> 100 ml (25% w/v), <b>Ointment</b> 25% w/w (25g)	Adults: Apply 3 times at 12-hrly intervals, over the whole body. Wash off 12 hr after the last application.	Local irritation, particularly in children.
Gamma Benzene Hexachloride	Take a proper bath and dry the skin then apply	Insomnia; paraesthesia; giddiness, agranulocytosis,



Name	Dose	Adverse Effects
Availability <b>Lotion</b> 1% w/v <b>Ointment</b> 1% w/w <b>Cream</b> 1% w/w <b>Shampoo</b> 1% w/v	lotion in a thin layer below the neck upto the sole of feet. Leave it for 8-12 hours and then take bath.	aplastic anaemia, skin irritation, contact dermatitis; ataxia; alopecia; severe neurologic toxicities have been reported <b>Contraindication:</b> seizures

## 1.7 ANTIEMETICS

Antiemetics are drugs effective against nausea and vomiting.

### Mechanism of action

They act on the brain by preventing the stimulation of the vomiting centre (chemoreceptor trigger zone-CTZ). Some medications act on the gut by speeding up the rate at which the stomach empties and help to facilitate the quick transit of food through intestine (prokinetic action).

### Indications

They are typically used to treat motion sickness and the side effects of opioid analgesics, general anesthetics and chemotherapy induced nausea and vomiting in cancer patients either alone or in combination.

Medicine	Indication	Dose	Adverse Effects
<b>Dopamine D<sub>2</sub>-receptor antagonists</b>			
<b>Domperidone</b>	Prophylaxis of post-op nausea and vomiting	Adults- tablet 10 to 20 mg 3 to 4 times a day Children- 0.3 to 0.6 mg/kg 3 times a day administer 15 to 30 minutes prior to meals and at bedtime if needed.	GI disturbances (including cramps) and hyperprolactinaemia, extrapyramidal effects and rashes; headache; dizziness; dry mouth.
<b>Metoclopramide</b>	Prophylaxis of post-op nausea and vomiting GERD Diabetic gastric stasis Prophylaxis of chemotherapy-induced nausea and vomiting	Oral: Tablet 10 mg, up to thrice daily. Max duration: 5 days.	Extrapyramidal symptoms (especially in children and young adults); tardive dyskinesias on prolonged use; hyperprolactinaemia; drowsiness, restlessness, dizziness, headache, diarrhoea, depression, hypotension and hypertension reported; rarely, neuroleptic malignant syndrome; rashes, pruritus, oedema; cardiac

Medicine	Indication	Dose	Adverse Effects
			conduction abnormalities following intravenous administration; galactorrhoea; amenorrhoea; bradykinesia; gynaecomastia; insomnia.

## 1.8 ANTISPASMODICS

These are drugs, which are used to relieve spasm of smooth muscle.

Medicine	Indications	Dose	Adverse Effects
<b>Dicyclomine</b> (Anticholinergic activity)	<ol style="list-style-type: none"> <li>1. Intestinal and renal colic, abdominal cramps: symptomatic relief is afforded if there is no mechanical obstruction.</li> <li>2. Nervous and drug induced diarrhoea, functional diarrhoea,</li> <li>3. Spastic constipation, irritable bowel syndrome.</li> <li>4. Pylorospasm, gastric hyper motility, gastritis, nervous dyspepsia.</li> <li>5. To relieve urinary frequency and urgency, enuresis in children.</li> <li>6. Dysmenorrhoea</li> </ol>	<p>Oral Adults: 10-20 mg three times a day.</p> <p>Parenteral IM injection: 80 mg daily in 4 divided doses.</p>	<p>Dry mouth; nausea; vomiting; constipation; taste loss; anorexia; dizziness; dyskinesia; lethargy, respiratory arrest; drowsiness; photophobia, blurred vision; increased ocular pressure; tachycardia; urinary retention</p> <p><b>Contraindication:</b> GI obstruction</p>

## 1.9 ORAL REHYDRATION SOLUTIONS (ORS)

Let us now go through the Oral Rehydration Solutions (ORS).

### Indications

Dehydration from acute diarrhoea. Available in the form of ORS powder.

Constituents of ORS as given below:

Constituents	Amount per Litre of Water
Glucose salt solution	5 and 37.5 G
Sodium chloride	2.6 g/litre of water
Sodium citrate	2.9 g/litre of water
Potassium chloride	1.5 g/litre of water
Glucose (anhydrous)	13.5 g/litre of water
Sodium bicarbonate	2.5 g/litre of water

In cases of cholera, oral rehydration salt containing a higher concentration of sodium may be required to prevent hyponatremia.

**Preparation of ORS solution**

The solution may be prepared either from prepackaged sugar/salt mixtures or from bulk substances and water. Solutions must be freshly prepared, preferably with recently boiled and cooled water. Accurate weighing and thorough mixing and dissolution of ingredients in the correct volume of clean water are important. Administration of more concentrated solutions can result in hypernatremia.

**Dose**

Oral 5 g (single use): Dissolve in water and drink; 37.5 g: to reconstitute it with 1 litre of clean water. Adults- Fluid and electrolyte loss in acute diarrhoea; 200 to 400 ml solution after every loose motion.

**Adverse Effects**

Vomiting- may indicate too rapid administration; hypernatremia and hyperkalemia may result from overdose in renal impairment.

**Check Your Progress 3**

1) Define scabies.  
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2) Discussed the indication for antiemetic.  
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3) Write the use of antispasmodics.  
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**1.10 HEMATINICS, VITAMINS AND MINERALS**

Let us now go through the Hematinics, Vitamins and Minerals alongwith their indications, dose and adverse effects.

Medicine	Indications	Dose	Adverse Effects
<b>Ascorbic Acid (Vitamin C)</b>	Prevention and treatment of scurvy.	Dose Adult and child- Prophylaxis of scurvy: 25to 75 mg daily.	Gastrointestinal disturbances reported with large doses; failure of conception; kidney oxalate stones.

Medicine	Indications	Dose	Adverse Effects
		Treatment of scurvy: 0.5 to 1.5 g/day.	<b>Contraindications</b> Hyperoxaluria.
<b>Calcium Carbonate + Vitamin D<sub>3</sub></b>	Prevention and treatment of osteoporosis and osteomalacia, nutritional supplement.	Calcium 1000 - 1300 mg daily Vitamin D <sub>3</sub> 200 - 800 IU daily.	Constipation, flatulence, nausea, abdominal pain and diarrhoea; pruritus, rash and urticaria.
<b>Iodine</b>	Prevention and treatment of iodine deficiency, thyrotoxicosis and hyperthyroidism.	Oral: Adult- Endemic moderate to severe iodine deficiency: during pregnancy and one year postpartum, 300 to 480 mg once a year or 100 to 300 mg every 6 months; women of child-bearing age, 400 to 960 mg once a year or 200 to 480 mg every 6 months. Iodine deficiency; 400 mg, <b>during pregnancy</b> , single dose of 200 mg.  Child- Iodine deficiency: infant under 1 year, single dose 100 mg; 1 to 5 years, 200 mg once a year; above 6 years 400 mg once a year.	Hypersensitivity reactions; goiter and hypothyroidism; hyperthyroidism; bronchitis; eosinophilia; rashes; headache; salivation.
<b>Methylcobalamin</b>	To prevent neurological disorder in patients with neuropathy due to diabetes, alcohol or other drug induced neuropathies	Initially 1000 mcg 3 times a day for 2 weeks, thereafter 1000 mcg every 3 months by intramuscular injection in case of pernicious anaemia and other macrocytic anaemia. In cases with neurological involvement, initially 1 mcg on alternate days. Until no further improve-	Itching; anaphylactic shock with parenteral, pulmonary oedema; CHF; polycythemia vera.

Medicine	Indications	Dose	Adverse Effects
		ment, thereafter 1000 mcg every 2 to 3 months. Prophylaxis: 1000 mcg every 2 to 3 months.	
<b>Nicotinamide</b>	Treatment of pellagra; hartnup's disease; inflammatory skin disease.	Adults- Treatment of pellagra: up to 500 mg daily in divided doses.	Dryness of skin; also pruritus, erythema, burning and irritation; hepatotoxicity, cholestasis; portal fibrosis; transient liver dysfunction; tautness of face.
<b>Pyridoxine</b>	Treatment of pyridoxine deficiency due to metabolic disorders; isoniazid neuropathy; sideroblastic anaemia.	Adults- Deficiency states: 25 to 50 mg up to 3 times daily. Isoniazid neuropathy, prophylaxis: 10 mg daily. Isoniazid neuropathy, treatment: 50 mg, 3 times daily Sideroblastic anaemia: 100 to 400 mg daily in divided doses.	Chronic administration of high doses may cause peripheral neuropathies; paresthesia; neurotoxicity; muscular weakness
<b>Riboflavin</b>	Vitamin B <sub>2</sub> deficiency; ariboflavinosis.	Adults and children- Treatment of vitamin B <sub>2</sub> deficiency: up to 30 mg daily in divided-doses Prophylaxis of vitamin B <sub>2</sub> deficiency: 1 to 2 mg daily	Swelling of lips, face and tongue and difficulty in breathing.
<b>Vitamin A</b>	Prevention and treatment of vitamin A deficiency; prevention of complications of measles.	Adults- Prevention of vitamin A deficiency: 2,00,000 units every 6 months; Pregnant woman, maximum of 10,000 units daily or maximum 25,000 units weekly; mothers, 200,000 units at delivery or within 6 weeks. Treatment of	No serious or irreversible adverse effects in recommended doses; high intake may cause birth defects; transient increased intracranial pressure in adults or a tense and bulging fontanelle in infants (with high dosage); massive overdose can cause rough skin, dry hair,

Medicine	Indications	Dose	Adverse Effects
		<p>xerophthalmia; (except woman of childbearing age) 2,00,000 units on diagnosis, repeated next day and then after 2 weeks; (woman of child-bearing age), 5000 to 10,000 units daily for at least 4 weeks or up to 25000 units weekly.</p> <p>Children - Prevention of vitamin A deficiency: infant under 6 months, 50,000 units; 6 to 12 months, 100,000 units every 4 to 6 months, preferably at measles vaccination; Over 1 year, 200,000 units every 4 to 6 months.</p> <p>Treatment of xerophthalmia; infant under 6 months, 50,000 units on diagnosis, repeated next day and then after 2 weeks; 6 to 12 months, 1,00,000 units immediately on diagnosis, repeated next day and then after 2 weeks; over 1 year, same as adults.</p> <p><b>Contraindications</b> Hypervitaminosis.</p>	<p>enlarged liver, raised erythrocyte sedimentation rate, raised serum calcium and raised serum alkaline phosphates concentrations; hair loss; redness of skin; anorexia; weight loss.</p>
<p><b>Iron Salts</b> Oral-Ferrous Gluconate, Ferrous Sulphate, Iron Sucrose,</p>	<p>Iron-deficiency anaemia.</p>	<p>Oral: Adults- Iron-deficiency anaemia: Elemental iron 100 to 200 mg daily in divided doses.</p>	<p>Nausea, vomiting, metallic taste; constipation, diarrhoea, dark stools, epigastric pain, gastrointestinal irritation; long-term or</p>

Medicine	Indications	Dose	Adverse Effects
Sodium Ferric Gluconate Parenteral - Iron Dextran		Prevention of iron deficiency anaemia (in those at particular risk): for woman elemental iron 60 mg daily. Children- Under 5 years: Elemental iron 2 mg/kg (max. 30 mg) daily. Over 5 years: elemental iron 30 mg daily. Over 5 years: folic acid may also be given.	excessive administration may cause haemosiderosis; allergic reaction; back pain; staining of teeth. Parenteral: Pain at injection site, sterile abscess
<b>Folic Acid</b>	Treatment of folate-deficiency megaloblastic anaemia; prevention of neural tube defect in pregnancy.	Adults- Treatment of folate-deficiency, megaloblastic anaemia: 5 mg daily for 4 months (up to 15 mg daily may be necessary in mal-absorption states).	Neuropathy; bronchospasm; skin eruption; anorexia; skin rash; status epilepticus

### 1.11 DIURETICS

Diuretics increase urinary excretion of water and electrolytes and are used to relieve oedema associated with heart failure, nephrotic syndrome or hepatic cirrhosis. Some diuretics are used at lower doses to reduce raised blood pressure.

Medicine	Indications	Dose	Adverse Effects
<b>Loop diuretics:</b>			
Furosemide	To relieve oedema associated with heart failure, nephrotic syndrome or hepatic cirrhosis	Adults- Oedema: initially 40 mg daily on waking up; maintenance dose 20 to 40 mg daily; may be increased to 80 mg daily or more in resistant edema. Children- 1 to 3 mg/kg daily (max. 40 mg daily).	Renal failure with anuria; pre-comatose states associated with liver cirrhosis; hypersensitivity.
<b>Thiazide diuretics:</b>			
Hydrochlorothiazide	Hypertension To relieve oedema	Adults- Hypertension: 12.5	Hypokalaemia; oliguria; hypomagnesaemia;



Medicine	Indications	Dose	Adverse Effects
	Nephrogenic diabetes insipidus	to 25 mg daily. Oedema: initially 25 mg daily on waking up increased to 50 mg daily if necessary. Severe oedema in patients unable to tolerate loop diuretics: up to 100 mg either daily or on alternate days (max. 100 mg daily). Elderly- Hypertension: initially 12.5 mg daily. Oedema: initially 12.5 mg daily.	hyponatraemia; hypochloaemic alkalosis; hypercalcaemia; hyperglycemia; hyperuricaemia.
<b>Osmotic diuretics:</b>			
Mannitol	Treatment of glaucoma and cerebral oedema	Raised intracranial or intraocular pressure: By i.v. infusion as a 20% solution infused over 30-60 minutes, Adults- 0.25-2g/kg; Children - 0.5-1.5g/kg.  Cerebral oedema: By i.v. infusion as a 20% solution infused rapidly, Adults and Children- 1g/kg.	Headache, nausea, vomiting, dehydration, oedema, hypernatraemia, inflammation, skin necrosis, urticaria, chills, convulsions, fluid and electrolyte imbalance, acidosis, circulatory overload, visual disturbance.

## 1.12 SEDATIVES AND ANTIEPILEPTICS

Sedatives are drugs that are used to calm the recipient without inducing sleep. These are commonly indicated for management of anxiety, seizure control and insomnia.

These are commonly classified into:

- **Barbiturates:** Phenobarbitone
- **Benzodiazepines:** Diazepam, lorazepam, midazolam, alprazolam
- **Non benzodiazepines:** Zopiclone, Zolpidem, Zaleplon

Some of the commonly used sedatives in clinical practice are discussed below:

Medicine	Dose	Adverse Effects
<b>Benzodiazepines</b>		
Diazepam	<p>Adults- <b>Anxiety:</b> 2 mg 3 times daily, increased if necessary to 15 to 30 mg daily in divided doses. <b>Insomnia:</b> 5 to 15 mg at bedtime. Children- Oral 1-2.5 mg, 3 or 4 times daily (Not for use under 6 months). Elderly or debilitated- <b>Anxiety:</b> half adult dose. Adults-<b>Treatment of status epilepticus and convulsions due to poisoning:</b> 10 mg at the rate of 1 ml/min (5 mg) repeated if necessary after 10 min. Children-Under 12 years: 300 to 400 µg/kg, repeated after 10 min if necessary.</p>	Drowsiness and light-headedness the next day; confusion and ataxia (especially in the elderly); amnesia; dependence; paradoxical increase in aggression; muscle weakness; increased appetite; weight gain.
Alprazolam	<p>Adults- 0.25 to 0.5 mg daily 2 to 3 times a day. Children- Not recommended</p>	Drowsiness and light-headedness on the next day; confusion and ataxia (especially in the elderly); amnesia; dependence; paradoxical increase in aggression; muscle weakness; occasionally: headache, vertigo, hypotension, salivation changes, gastrointestinal disturbances, visual disturbances, dysarthria, tremor, changes in libido, incontinence, urinary retention; blood disorders and jaundice reported; skin reactions.
Lorazepam	<p>2 to 6 mg/day given in divided doses, initial dose of 2 to 3 mg/day given twice or thrice a day. Elderly or debilitated patients: Initial dosage of 1 to 2 mg/day in divided doses</p>	Nausea and vomiting, dizziness; weakness; blurred vision; vertigo.

**Anti-epileptics**

These are drugs, which are commonly used to treat seizures. Seizure is a condition in which there is abnormal excessive electrical activity of the brain. Epilepsy is a

disease condition with recurrent seizures. This is characterised by increased excitatory pathway (glutamate) and decreased inhibitory pathway (GABA).

Status epilepticus is a medical emergency, which carries a high mortality rate.

Commonly used drugs are phenytoin, phenobarbitone, valproate, carbamazepine, levotiracetam, lamotrigine, topiramate.

Medicine	Dose	Adverse Effects
Phenytoin	<p>Oral or slow intravenous injection or infusion Adults- Status epilepticus: (with regular BP and ECG monitoring) 18 mg/kg at rate not exceeding 50 mg/min as loading dose, maintenance dose of about 100 mg should be given thereafter at an interval of 6 to 8 h (dose can be reduced according to weight). Children- Status epilepticus: 20 mg/kg at a rate not exceeding 1 mg/kg/min, maintenance dose 4-7 mg/kg/day in 2 divided doses, max dose 300 mg/day.</p>	<p>Gum hypertrophy, acne, hirsutism, ataxia, cerebellar-vestibular symptoms like nystagmus, diplopia; slurred speech (may be signs of overdose); behavioural disorders, hyperglycemia; fever; neurological changes (peripheral neuropathy, choreiform movements, impaired cognition, increased seizure frequency); osteomalacia, rickets (associated with reduced plasma calcium levels); lymph-node enlargement; blood disorders including megaloblastic anaemia (may be treated with folic acid), leucopenia, thrombocytopenia, agranulocytosis with or without bone marrow depression; rashes (discontinue; if mild reintroduce cautiously, but discontinue if recurrence); very rarely, Stevens-Johnson syndrome (erythema multiforme), systemic lupus erythematosus, toxic epidermal necrolysis; hepatitis, hepatic failure.</p>
Phenobarbitone	<p>Slow intravenous injection Status epilepticus: (dilute injection 1 in 10 with water for injections), Adults- 10 mg/kg at a rate of not more than 100 mg/min (up to max. total dose of 1 g); Children- 10-20 mg/kg at a rate of not more than 30 mg/min. Oral</p>	<p>Sedation, mental depression, agitation, hallucination, syncope; ataxia, nystagmus; allergic skin reactions including rarely, exfoliative dermatitis, toxic epidermal necrolysis, Steven's- Johnson syndrome (erythema multiforme); paradoxical excitement,</p>

Medicine	Dose	Adverse Effects
	Adults- 60-180 mg daily at night. Children-1 month- 12 years: 1-1.5 mg/kg twice daily, maintenance dose 2.5-4 mg/kg once/twice daily. 12-18 years: Initially 60-180 mg twice daily, maintenance dose 60-180 mg once daily.	restlessness and confusion in the elderly; irritability and hyperactivity in children.
Sodium Valproate	Adults- 600 mg daily in two divided doses (preferably after food) thereafter increases by 200 mg at 3 days interval clinical response till desired. Children- Initial dose 20 mg/kg/day max. dose 60 mg/kg/day.	Gastrointestinal irritation, nausea, increased appetite and weight gain, hyperammonaemia; ataxia, tremor; transient hair loss (regrowth may be curly); oedema, thrombocytopenia, inhibition of platelet aggregation; impaired hepatic function and rarely, fatal hepatic failure, extrapyramidal symptoms, leucopenia, pancytopenia, red cell hypoplasia, fibrinogen reduction; irregular periods, amenorrhoea, gynaecomastia, hearing loss, vasculitis, hirsutism and acne reported; hallucinations; abnormal gut; pneumonia; headache; taste perversion; polycystic ovary.
Carbamazepine	Adults- Initially 100 and 200 mg 1 to 2 times daily increased slowly to usual dose of 400 mg to 1.2 g daily in divided doses. In some cases 1.6 to 2 g may be needed. Administer lower initial dose to elderly. Children- Start with 5-10 mg/kg/day in two to three divided doses then gradually increases at weekly intervals to a max. dose of 30-35 mg/kg/day.	Sedation, dizziness, vertigo, diplopia and ataxia. Vomiting, diarrhoea, worsening of seizures are also seen with higher doses. Hypersensitivity reactions are rashes, photosensitivity, hepatitis, lupus like syndrome, rarely agranulocytosis and aplastic anaemia.

### 1.13 EXPECTORANTS AND MUCOLYTICS

These are mucokinetic agents used to increase bronchial secretion or reduce its viscosity, facilitating its removal by coughing. Expectorants are occasionally used alone and they are commonly combined with antihistaminic,

These are further classified as bronchial secretion enhancers or mucolytics.

**Bronchial secretion enhancers:**

**Sodium or Potassium citrate:** It is considered to increase bronchial secretion by salt action.

**Potassium iodide:** It is secreted by bronchial glands and can irritate the airway mucosa. Prolonged use may lead to iodism.

**Guaiphenesin, balsum of Tolu, vasaka:** Plant products which are supposed to enhance bronchial secretion and mucociliary function while being secreted by tracheobronchial glands.

**Ammonium chloride:** Reflex increase respiratory secretions.

**Mucolytics**

Name	Dose	Adverse Effects
<b>Mucolytics</b>		
Bromhexine	Adults: 8 mg TDS, Children 1- 5 years- 4 mg BD. Children 5-10 years- 4 mg TDS.	Rhinorrhoea and lacrimation, gastric irritation, hyper- sensitivity
Ambroxol	As amucolytic Adults: 60-120 mg daily, in 2-3 divided doses. Children: <2 yr: 7.5 mg twice daily; 2-5 yr: 7.5 mg twice/ thrice daily; 6-12 yr: 15 mg twice/thrice daily.	Rhinorrhoea and lacrimation, gastric irritation, hyper- sensitivity
Acetylcysteine	Adults: Tab: 600 mg daily as a single or in 3 divided doses.Paracetamol poisoning as 5% soln.: Initial: 140 mg/kg followed by 70 mg/kg 4 hourly for additional 17 doses. Inhalation As 10% soln.: 6-10 ml 3-4 times/day or 2-20 ml 2- 6 hourly as necessary. As 20% soln.: 3-5 ml 3-4 times/day, or 1-10 ml 2-6 hourly as necessary.Endotracheal As a mucolytic 10% or 20% soln.: 1-2 ml every hr.	GI irritation and rashes

**1.14 PRENATAL STEROIDS**

Corticosteroid stimulation of developmentally regulated gene expression and physiologic functions result in maturation of the lungs and some other tissues. Antenatal steroids accelerate development of type 1 and type 2 pneumocytes, leading to structural and biochemical changes that improve both lung mechanics (maximal lung volume, compliance) and gas exchange.

**Drugs:**

**Betamethasone:** Two doses of 12 mg given intramuscularly 24 hours apart OR

**Dexamethasone:** Four doses of 6 mg given intramuscularly 12 hours apart.

A non-sulfite containing preparation should be used as the sulfite preservative (NNF60211) commonly used in dexamethasone preparations may be directly neurotoxic in newborns

## 1.15 SURFACE ANAESTHESIA FOR REPAIR OF MINOR INJURY

Adequate anaesthesia is necessary for complete examination, cleansing and repair of wounds.

**Topical anaesthesia**

**EMLA (a eutectic mixture of lignocaine 2.5% and prilocaine 2.5% )**

**Indications:**

Normal intact skin for local analgesia

Genital mucous membranes for superficial minor surgery and as pretreatment for infiltration anaesthesia

**Dose:** The dose of EMLA Cream that provides effective analgesia depends on the duration of the application over the treated area. (1-2 gm/cm<sup>2</sup> of skin)

**Adverse effects:** erythema or oedema or may be the locus of abnormal sensation

**Local anaesthesia**

- 1% lignocaine with adrenaline slowly infiltrated into the wound, (care should be taken not to use adrenaline on finger tips)

**Lignocaine+ adrenaline:**

**Indications:** For infiltration and nerve block anaesthesia

**Dose:** Lignocaine dose should be kept below 500 mg (maximum dose 7 mg/kg)

**Precautions:** Local anaesthetic effect may be reduced if injected into an inflamed or infected area.

**Adverse effects:** Topical and local infiltration may lead to papules, burns, rash, skin irritation, burning sensation and blanching.

## 1.16 ANTIBIOTICS FOR EYE, EAR DROPS AND OINMENTS

Medicine	Indications	Dose	Adverse Effects
<b>Gatifloxacin</b> 0.3 % solution for eye/ear drops	Bacterial conjunctivitis	Adults: Ophthalmic As 0.3% soln.: Instill 1 drop 2 hourly into	Conjunctival irritation, increased lacrimation, keratitis, papillary conjunctivitis, chemosis,

Medicine	Indications	Dose	Adverse Effects
		affected eye(s) while awake (up to 8 times/day) for the 1st 2 days then reduce to 1 drop 4 times/day while awake for the next 5 days.	conjunctival haemorrhage, ocular dryness and redness, ocular discharge/irritation/pain, eyelid oedema, headache, reduced visual acuity, and taste disturbance.
<b>Chloramphenicol</b> 5% solution for ear drops 0.5% solution for eye drops 1% ointments	Bacterial conjunctivitis, otitis externa	Otitis externa: As 5% soln.: Instill 2-3 drops 2-3 times/day. Ocular infections: Instill 1 drop of a 0.5% solution every 2 hr. Increase dosage interval upon improvement. To continue treatment for at least 48 hr after complete healing. Reduce dose once symptoms are controlled or apply a 1% ointment 3-4 times daily.	Conjunctival irritation, increased lacrimation
<b>Erythromycin</b> 0.5% ointment	Treatment and prophylaxis of ophthalmic infections	Adults: As 0.5% ointment. Apply approx 1 cm length to the affected eye(s) up to 6 times daily. Children: As 0.5% ointment. Apply approx 1 cm in length into each of the lower conjunctival sac, then massage gently to spread the ointment.	Conjunctival irritation, increased lacrimation

## 1.17 DRUGS USED IN RESUSCITATION AND LIFE SUPPORT

Let us now go through the drugs used in resuscitation and life support.



Medicine	Indications	Dose	Adverse Effects
Adrenaline (Epinephrine)	Severe anaphylactic reaction; severe angioedema; cardiac arrest; haemostatic agent.	Intramuscular injection Anaphylaxis: preferable site is the midpoint in anterior thigh [1:1000 solution]. This route should be used by specialists only with extreme care. Slow intravenous injection When there is doubt regarding adequacy of circulation and absorption from the intramuscular site; slow intravenous injection of 1:10000 (10 mg/ml) solution be injected in severely ill patients only.	“Epinephrine fastness”, tachycardia and arrhythmias, hypertension, tremor, anxiety, sweating, nausea, vomiting, weakness, hyperglycemia, dizziness, pulmonary oedema have all been reported; headache common.
Atropine	To inhibit salivary secretions; to inhibit arrhythmias resulting from excessive vagal stimulation; to block the parasympathomimetic effects of anticholinesterases such as neostigmine; organophosphate poisoning; antispasmodic; mydriasis and cycloplegia.	Intravenous injection Adults- 0.3 to 0.6 mg immediately before induction of anaesthesia. Intraoperative bradycardia; 300 to 600 mcg (longer dose in emergency). Inhibition of bradycardia; 0.4 to 1 mg. Reversal of neuromuscular block; 0.6 to 1.2 mg. Children: Pre-medication: 20 mcg/kg; Inhibition of bradycardia: 10 to 30 mcg/kg. Reversal of neuromuscular block: 20 mcg/kg.	Dry mouth; blurred vision; photophobia; flushing and dryness of skin; rash; difficulty in micturition; less commonly arrhythmias.

Medicine	Indications	Dose	Adverse Effects
		<p>Intramuscular route or subcutaneous</p> <p>Premedication (30 to 60 min before induction of anaesthesia): 300 to 600 mcg.</p> <p>Children- 20 mcg/kg (max. 60 mcg).</p> <p>Intra operative bradycardia: (1 to 12 years) 10 to 20 µg/kg.</p>	
Noradrenaline	Acute hypotension, adjunct in cardiac arrest, upper gastrointestinal haemorrhage.	<p><b>Parenteral</b></p> <p>Intravenous</p> <p>Acute hypotension</p> <p>Adults: 8-12 mcg/minute, up to 8-30 mcg/minute in refractory shock.</p> <p>Infused using a solution of 4 mcg/ml in glucose 5%, or sodium chloride 0.9% and glucose 5% at a rate of 2-3 ml/minute. Adjust according to blood pressure response.</p> <p>Average maintenance dose: 0.5-1 ml/minute (2-4 mcg/minute).</p> <p>Infuse via a central venous catheter or into a large vein.</p> <p>Children: Administer at a rate of 2 mcg/minute. Alternatively, 2 mcg/ml/minute. Adjust rate according to BP response and perfusion.</p> <p>Elderly: Initial dose should be at low end of dose range. Upper gastrointestinal</p>	Elevation of blood pressure, bradycardia, peripheral ischemia, arrhythmias, anxiety, transient headache, respiratory difficulty, extravasation necrosis at injection site.

Medicine	Indications	Dose	Adverse Effects
		<p>haemorrhage:                      Adults: 8 mg in 250 ml of 0.9% sodium chloride injection via intraperitoneal route. Alternatively, instill 8 mg in 100 ml of 0.9% sodium chloride solution through a nasogastric tube every hr for 6-8 hrs, then every 2 hrs for 4-6 hrs. Withdraw drug gradually. Dilute with 5% glucose injection, with or without sodium chloride; dilution with sodium chloride injection alone is not recommended.</p>	
Magnesium sulphate	Prevention of recurrent seizures in eclampsia; prevention of seizures in pre-eclampsia; acute nephritis in children.	Intravenous injection (concentration of magnesium sulphate should not exceed 20%) Prevention of seizure occurrence in eclampsia: initially 4 g over 5 to 15 min, followed by infusion 1g/h for at least 24 h after last seizure. If seizures recur, additional dose of 2 g (or 4 g if body weight is over 70 kg).	Generally associated with hypermagnesaemia, nausea, vomiting, thirst, flushing of skin, hypotension, arrhythmias, and coma, respiratory depression, drowsiness and confusion, loss of tendon reflexes, muscle weakness; hypothermia; stupor.

### 1.18 LET US SUM UP

In this unit we have discussed about vaccines, route and doses and schedule of administering; common medications used for fever, pain, infections; drugs for scabies treatment; anti-emetics and its indications; antispasmodics and when to

use; counsel the correct use of ORS and Hematinies, Vitamins and Minerals; how and when to use diuretics, antihypertensives, drugs for diabetes mellitus and sedatives; appropriate use of drugs under National Health Programmes.

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## 1.19 MODEL ANSWERS

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### Check Your Progress 1

- 1)
  - a) TP
  - b) 6, 10 and 14
  - c) Intra-muscular
  - d) Sub-cutaneous
  - e) HIB, DPT and Hep B
- 2) Local reactions including inflammation and lymphangitis may occur. Sterile abscess may develop at the injection site;
  - Fever
  - Headache
  - Malaise starting a few hour after injection and lasting for 1-2 days may occur.
  - Hypersensitivity reactions can occur including rarely, anaphylaxis.

### Check Your Progress 2

- 1) Aluminium hydroxide + Magnesium hydroxide, Omeprazole, Pantoprazole and Ranitidine
- 2) Cotrimoxazole, Ampicillin, Amoxicillin, Ciprofloxacin and Norfloxacin
- 3) Cotrimoxazole, Ampicillin, Amoxicillin and Ciprofloxacin
- 4) Mild to moderate pain including dysmenorrheal pain, headaches, pain relief in osteoarthritis, rheumatoid arthritis, autoimmune arthritis and soft tissue lesions, pyrexia including post-immunisation pyrexia, acute migraine attack.
- 5) Gastrointestinal: Gastric irritation, erosions, peptic ulceration, gastric bleeding/perforation, aesophagitis.

Hepatic: Raised transaminases, hepatic failure (rare)

CNS: Headache, mental confusion, behavioural disturbances, seizure precipitation

Haematological: Bleeding, thrombocytopenia, haemolyticanemia, agranulocytosis

Others: Asthma exacerbation, nasal polyposis, skin rashes, pruritus, angioedema

### Check Your Progress 3

- 1) These are drugs, which are active against scabies. Scabies is an infestation of the skin by the mite *Sarcoptes scabiei* that results in an intensely pruritic eruption with a characteristic distribution pattern.

- 2) They are typically used to treat motion sickness and the side effects of opioid analgesics, general anesthetics and chemotherapy induced nausea and vomiting in cancer patients either alone or in combination.
- 3) These are drugs, which are used to relieve spasm of smooth muscle.

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## 1.20 REFERENCES

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- 1) National formulary of India (NFI) 5<sup>th</sup> edition 2016. Published by Indian Pharmacopoeia commission, Ministry of Health & Family Welfare, GoI.
- 2) Katzung BG & Trevor AJ (2015). Basic & Clinical Pharmacology (13<sup>th</sup>ed.) New York : McGraw-Hill Medical.
- 3) Tripathi, K. (2008). *Essentials of medical pharmacology* (7<sup>th</sup> ed.). New Delhi: Jaypee Brothers.
- 4) Universal Immunization Program. Available from
  - i) <http://mohfw.nic.in/WriteReadData/1892s/5628564789562315.pdf>
- 5) Diagnosis and Treatment of Malaria 2013. Available from
  - i) <http://www.nvbdc.gov.in/Doc/Diagnosis-Treatment-Malaria-2013.pdf>
- 6) Treatment of TB. (Part 1 & 2). Technical and Operational Guidelines for TB Control in India 2016. RNTCP. Available from <http://www.tbcindia.nic.in/showfile.php?lid=3219>
  - i) <http://www.tbcindia.nic.in/index1.php?lang=1&level=3&sublinkid=4611&lid=3221>
  - ii) <http://www.tbcindia.nic.in/index1.php?lang=1&level=2&sublinkid=4573&lid=3177>
- 7) Treatment of visceral leishmaniasis. NVBCDP. Available from
  - i) <http://nvbdc.gov.in/doc/guidelines-diagnosis-treatment-ka.pdf>
- 8) National Leprosy Eradication Program. Available from
  - i) <http://clinicaestablishments.nic.in/WriteReadData/516.pdf>