Infectious disease

Antibiotic

Antibiotics are the life saving drugs, their use must be restricted, rationale and appropriate for the clinical context. For judicious use of antibiotic proper knowledge of the antibiotic, causative organism and site of infection is necessary.

	Spectrum/group	Antibiotic	Sensitivity
Penicillin	Narrow spectrum penicillin	Benzyl penicillin (penicillin G), procaine penicillin and phenoxymethylpenicillin (penicillin V)	Streptococci, Staphylococci, Clostridium, and Listeria genera
	Moderate spectrum penicillin	Ampicillin and amoxycillin.	Narrow spectrum + gram negative coverage without Pseudomonas coverage
	Broad spectrum penicillin	Piperacillin, carbenicillin and ticarcillin	Above plus activity against *Pseudomonas aeruginosa*
Cephalosporin	1st generation	Cephalexin, Cephradine	1st Generations cephalosporin = Broad spec. penicillins, Excellent activity against Gram positive and some activity against Gram negative
	2nd generation	Cefuroxime, cefprozil	As for 1st generation Plus Haemophilus (including beta-lactamase producers), retain Gram positive activity and extended Gram negative activity
	3rd generation	Cefotaxime, ceftriaxone and ceftazidime	Have further anti Gram negative activity and retain Gram positive activity, ceftazidime also has activity against *Pseudomonas aeruginosa*
	4th generation	Cefepime	3rd generation plus pseudomonas, staph. aureus and streptococci

	Next generation Cephalosporin	Ceftaroline, Ceftobiprole (IV)	4th generation plus MRSA
Other Beta lactams	Monobactum	Aztreonam	Gram negative coverage only
	Carbapenem	Imipenem, Meropenem	Betalactam activity and anaerobes
	Aminoglycosides	Amikacin, gentamicin, streptomycin, tobramycin and kanamycin	Excellent activity against Gram negative bacilli
	Tetracyclines	Tetracycline, doxycycline	Have both Gram positive and Gram negative organisms coverage, it also covers particular pathogens that few other antibiotics can, such as *Chlamydia* and *Legionella.*
	Macrolides	Azithromycin, erythromycin, roxythromycin and clarithromycin.	Gram positive organisms (*S. pyogenes* and *S. aureus*), CAP pathogens (*S. pneumoniae* and *H. influenzae*) and C*hlamydia* and *Legionella*
	Quinolones	Levofloxacin, ofloxacin, norfloxacin and ciprofloxacin	Have both Gram positive and Gram negative organisms coverage, ONLY oral antibiotics with significant activity against *Pseudomonas aeruginosa*
	Glycopeptides	Vancomycin	Active against Gram positive organisms. The major use in methicillin resistant Staphylococcus aureus (MRSA) infection

For appropriate use of antibiotic culture and sensitivity (C/S) report will reduce unnecessary antibiotic use. But C/S should advise before use of antibiotic and if patient already on antibiotic then it should be stopped for 3 days then sample for C/S test should be collected.

1. Throat swab culture (when patient present with sore throat, pain in throat, difficulty in swallowing)

2. Urine culture (when patient present with dysuria, frequency of micturition, foul smelling urine, cloudy urine).

3. Blood culture (in suspected enteric fever, pneumonia, septicaemia, liver abscess, pyelonephritis etc).

A simple guide to antibiotic therapy

1. RTI-choose antibiotic with Gram positive coverage-levofloxacin, penicillin, cephradine, cefuroxime,azithromycin, amoxicillin, erythromycin.

2. UTI-choose antibiotic with Gram negative coverage-nitrofurantoin, ciprofloxacin, ofloxacin etc.

3. Infection of abdominal cavity- choose antibiotic with Gram negative coverage-ciprofloxacin, ofloxacin, cefuroxime, ceftriaxone etc and metronidazole for anaerobes.

When a patient will need antibiotic (practical point of view)?

1. If a patient suffering from fever for more than 7 days.

2. Fever of any duration with either

a) Productive, purulent, foul smelling cough or

b) Symptoms of UTI or

c) Diagnosed cause of fever like liver abscess, typhoid fever, pneumonia, encephalitis, meningoencephalitis, PID etc or

d) Investigation-CBC-neutrophilic leucocytosis, or features of infection (CXR-consolidation, Urine R/E-pus cell >5/HPF, USG-pelvic collection etc.

e) Prophylactic antibiotic-after surgery, chemotherapy etc.

Viral fever

Diagnostic tools

1. Fever high grade in the first day, intensity of the fever gradually decreases from 1st day to 2nd day to 3rd day to 4th day; associated with generalized bodyache, sore throat, rhinorrhoea, appetite may be normal or slightly reduced.

2. On examination-temperature is raised, patient otherwise normal.

3. Investigation-diagnosis is clinical, but for exclusion of other infection investigation may be done usually if fever persists after 3 days. CBC-usually normal, CXR-normal, urine R/E-normal, MP-negative.

Management

1. Paracetamol 500 mg 6 to 8 hourly to reduce temperature.

2. Antihistamine if rhinorrhoea.

3. If sore throat-povidone iodine mouth wash (10 ml mixed in half glass warm water, then gargling 4 times daily for 7 days).

4. Tepid sponging.

Chicken pox in adult

Diagnostic tools

1. Vesicular eruption begins often on mucosal surfaces first, followed by rapid dissemination in a centripetal distribution (most dense on trunk and sparse on limbs).

2. Intense itching.

Management

1. Diet - normal.

2. Antihistamine to reduce itching.

3. Antibiotics to prevent secondary infection (commonly use antibiotics are those cover gram positive bacteria-phenoxymethyl penicillin, amoxicillin, levofloxacin, cephradine, cefuroxime etc).

4. Antiviral-indicated in

i) Uncomplicated chickenpox in adults when the patient presents within 24–48 hours of onset of vesicles.

ii) In all patients with complications and

iii) In those who are immunocompromised, including pregnant women, regardless of duration of vesicles.

Dose of antiviral

a) Oral acyclovir 800 mg 5 times daily for 5 days. In immunocompromised patient and pregnant women- acyclovir 5 mg/kg IV 8 hourly until patient improving then complete therapy with oral therapy until all lesions crusting over.

b) Visceral involvement (non- CNS) - aciclovir 5 mg/kg IV 8 hourly for 7 days.

c) Severe complications like encephalitis/ disseminated infection- aciclovir 10 mg/kg 8 hourly for 14-21 days.

Complications of chicken pox

1. Pneumonia

2. Encephalitis

A sample prescription of chicken pox

Shingles or Herpes zoster

Diagnostic tools

1. Burning discomfort occurs in the affected dermatome.

2. Vesicles appear 3-4 days later.

3. Thoracic dermatomes and the ophthalmic division of the trigeminal nerve commonly involved.

Management

1. Diet - normal.

2. Antiviral- oral acyclovir 800 mg 5 times daily for 7-10 days.

3. Analgesic -NSAID.

4. Antibiotic to prevent secondary infection.

5. Post-herpetic neuralgia requires aggressive analgesia, along with

a) Amitriptyline 25–100 mg daily

b) Gabapentin (commencing at 300 mg daily and building slowly to 300 mg twice daily or more) or pregabalin (commencing at 75 mg twice daily and building up to 100 mg or 200 mg 3 times daily if tolerated).

c) Capsaicin cream (0.075%) may be helpful.

Infectious mononeucleosis

Diagnostic tools

1. Patients complaint of fever, cough, sore throat.

2. On examination-severe pharyngitis with tonsillar exudates, cervical, axillary and inguinal lymphadenopathy and splenomegaly.

3. Macular, petechial or erythema multiforme rashes may occur (ampicillin induced).

Management

1. Diet - normal.

2. Send throat swab for culture and sensitivity (to detect any secondary infection in pharynx and tonsil).

3. Antibiotic- penicillin, avoid ampicillin or amoxicillin. Change according to C/S report.

4. Paracetamol for fever.

5. Povidone iodine mouth wash gargling relieves throat discomfort.

6. Aspirin gargling also helpful to reduce throat discomfort.

7. When pharyngeal oedema is severe, a short course of glucocorticoids e.g. prednisolone 30 mg daily for 5 days.

8. Contact sports should be avoided until splenomegaly has completely resolved because of the danger of splenic rupture.

9. Return to work governed by patient physical fitness.

Acute diarrhoea

Main target of management of acute diarrhoea/ food poisoning/ gastroenteritis is correction of dehydration. For this it is necessary to assess the patient properly.

Clinical grading of dehydration-

1. No sign of dehydration

2. Some sign of dehydration

3. Severe dehydration

Points	No sign of dehydration	Some sign of dehydration	Severe dehydration
Appearance	Normal	Lethargic	Obtunded
Eyes	Normal	Sunken	Very sunken
Tongue	Normal (wet)	Dry	Very dry
Skin pinch	Goes back normally	Goes back slowly	Goes back very slowly
Pulse	Normal	Rapid, low volume	Very fast, thready
Blood pressure	Normal	Normal or low orthostatic hypotension present	Very low (shock)
Urine output	Normal	Reduced	Severely reduced

Management

A) Rehydration

1. No sign of dehydration-can be managed at home with only ORS (ORS 1 c¨v‡KU cÖ‡Z¨Kevi cvZjv cvqLvbvi ci Lv‡eb|), plenty of oral fluid and proper education of the patient regarding return to hospital for admission.

Criteria of return to the hospital

a) Increased frequency of loose motion.

b) Dryness of the mouth cannot combat with oral fluid.

c) Reduction in urine volume.

d) Vomits frequently.

e) Cannot take oral fluid and foods.

2. Some and severe dehydration-patient should be managed at the hospital with

a) ORS (ORS 1 c¨v‡KU cÖ‡Z¨Kevi cvZjv cvqLvbvi ci Lv‡eb|), plenty of oral fluid.

b) IV fluid-cholera saline (rapidity of the fluid infusion depend on the patient condition and presence or absence of underlying heart disease, liver disease and kidney disease. Usually we give the first liter fluid very rapidly then reassess dehydration and then determine further fluid therapy.

B) Antibiotic- are used when

i) Patients have more severe and persistent diarrhoea.

ii) Patients have additional debilitating diseases such as heart failure, lung disease, and AIDS.

iii) Stool examination and testing discloses parasites, more serious bacterial infections (for example, Shigella), or C. difficile and

iv) Traveler's diarrhea.

C) Antidiarrhoeal, antimotility and antisecretory agents

Loperamide is an antimortility drug, cannot be given in children and in dysentry. Racecadotril is an antisectory drug that can be used in diarrhoea. Dose is 100 mg TDS. Continue treatment until 2 normal stools are recorded but maximum duration 7 days.

N: B: In diabetic patient use rice based ORS and normal saline to avoid extra glucose intake (cholera and ORS contain glucose).

If patient give history of reduction of urine output or no urine output then avoid cholera saline, use normal saline. Because these symptom suggest patient developed acute kidney injury and in this condition to avoid hyperkalaemia cholera saline (contains potassium) should be avoided (in AKI hyperkalaemia usually develops and life threatening, causes sudden death).

Dengue fever

Diagnostic tools

Dengue fever includes

1. Dengue fever (DF)
2. Dengue hemorrhagic fever (DHF)
3. Dengue shock syndrome (DSS)

Case definition of dengue fever

1. Sudden onset of continued fever. And

2. Two or more of the following features-

a. Severe headache

b. Retro-orbital pain

c. Severe myalgia / arthralgia / back pain

d. Hemorrhagic manifestations

e. Nausea/ vomiting/ abdominal pain

And

3. High index of suspicion based on period, population &place

And

4. Absence of convincing evidence of any other febrile illness.

Case definition of dengue hemorrhagic fever

1. Features of dengue fever at initial stage. And

2. Hemorrhagic manifestation evidenced through one or more of the following-

a. Positive tourniquet test

b. Petechiae / echymosis / purpura

c. Mucosal bleeding: epistaxis, gum bleeding

d. Bleeding from injection or other site

e. Hematemesis, melaena, hematuria, PV bleeding

f. Thrombocytopenia with platelet 100000/mm3 or less

And

3. Any evidence of plasma leakage due to increased capillary permeability manifested by one or more of the following-

a. A 20% or more rises in hematocrit for age or sex.

b. A 20% or more drop in hematocrit following treatment with fluids compared to baseline.

c. Pleural effusion/ ascites / hypoprotenaemia.

Case definition of dengue shock syndrome

When a case of DHF present with circulatory failure with one or more of the following-

1. Hypotension for the age.

2. Cold clammy skin, restlessness, rapid weak pulse.

3. Narrow pulse pressure (20 mm Hg or less).

4. Profound shock.

Investigation

1. Usually before 3 days no change in laboratory tests in febrile phase. So no test should be done before 3 days, unless otherwise indicated e.g. unusual hemorrhage. But once clinically suspected leucocyte and platelet count plus hematocrit should be done at least once per day.

2. Dengue IgM- is produced approximately 5 days after infection in both primary and secondary infections. So, should be tested at least after 5 days of onset of fever.

3. NS1 (non-structural protein)-NS1 positive 24 hours after onset of fever and remain positive up to 9 days.

Management

Dengue fever can be managed at outdoor basis. But dengue hemorrhagic fever and dengue shock syndrome must be managed at hospital

1. Diet - normal, plenty of fluid & homemade fruit juice intake.

2. Paracetamol to reduce fever.

3. Avoid NSAID, steroid.

4. For dengue hemorrhagic fever and dengue shock syndrome - IV fluid 5% DNS or blood transfusion may be required.

Leptospirosis

Diagnostic tools

1. Fever

2. History of prolonged immersion in contaminated water (sweeper).

3. Conjunctival congestion.

4. The patient may have a transient macular erythematous rash, but the characteristic skin changes are purpura and large areas of bruising. In severe cases there may be epistaxis, haematemesis and melaena, or bleeding into the pleural, pericardial or subarachnoid spaces. Jaundice present and liver enlarged, renal impairement present. (icteric leptospirosis (Weil's disease).

5. Definitive diagnosis of leptospirosis depends upon isolation of the organism-blood culture and sensitivity.

Management

1. Diet- normal, salt, fruit and protein restricted diet if AKI.

2. Blood transfusion- if bleeding manifestation.

3. Treatment of renal failure.

4. Cap. Doxycycline 100 mg 1 + 0 + 1 or inj. ceftriaxone 1 gm daily for 1 week.

5. If uveitis then oral and local steroid.

(In any infectious disease intravenous vs oral antibiotic therapy depends on patient's condition. If patient is toxic, vomits, cannot take oral foods, poor general condition then intravenous antibiotic should be used).

Enteric fever

Diagnostic tools

1. Fever stepladder pattern-gradually increases for 4 to 5 days.

2. Headache, myalgia, relative bradycardia etc.

3. Enlarged spleen.

4. Investigation-leucopenia and blood culture & sensitivity.

If patient presented with fever for more than 7 days and no history of taking antibiotic, blood C/S must be advised.

(N:B: practically fever for more than 7 days + normal WBC count or leucopenia + splenomegaly=Typhoid fever).

Management

1. Diet- normal

2. Tab. Paracetamol

3. Antibiotic

Empirical antibiotic should be started with one of the following (then change according to blood C/S report)

1. Co-trimoxazole 2 tab. 12 hourly

2. Ciprofloxacin 500 mg 12 hourly

3. Ceftriaxone 2 gm 12 hourly

4. Azithromycin 500 mg daily

5. Ofloxacin 200 mg twice daily

Total duration of antibiotic is 14 days.

(In any infectious disease intravenous vs oral antibiotic therapy depends on patient's condition. If patient is toxic, vomits, cannot take oral foods, poor general condition then intravenous antibiotic should be used).

Leprosy

Diagnostic tools

1. Patient may complaints of skin lesion like hypo pigmented skin lesion, plaque, nodule etc.

2. Features of peripheral nerve lesion (commonly median, ulnar, radial, common peroneal nerve involve)

3. On examination-loss of sensation over the skin lesion and local peripheral nerve thickened.

4. Skin or nerve biopsy-acid fast bacilli may be present or typical histology in a skin biopsy.

Management

Paucibacillary (2-5 skin lesions)

1. Diet- normal

2. Tab. Dapson 100 mg (1 tablet daily for 6 months)

3. Tab. Rifampicin 600 mg (one tablet monthly for 6 months)

Multibacillary (>5 skin lesions)

Monthly basis for 12 months

1. Tab. Rifampicin 600mg 1 + 0 + 0

2. Tab. Clofazimine 300 mg 1 + 0 + 0

Daily basis for 12 months

1. Tab. Dapson 100 mg 1 tablet daily

2. Tab. Clofazimine 50 mg 1tablet daily.

Paucibacillary with single lesion

1. Tab. Ofloxacin 400 mg- single dose

2. Tab. Rifampicin 600 mg-single dose

3. Tab. Minocycline 100 mg- single dose.

Giardiasis

Diagnostic tools

1. Patient presents with diarrhoea, abdominal pain, vomiting.

2. Examination of stool reveal cyst of giardia (stools obtained at 2-3-day intervals should be examined for cysts).

Management

1. Tinidazole 2 gm stat or metronidazole 400mg 8 hourly for 10 days.

Filariasis

Disgnostic tools

1. Acute filarial lymphangitis presents with fever, pain, tenderness and erythema along the course of inflamed lymphatic vessels. Inflammation of the spermatic cord, epididymis and testis is common.

2. Unilateral swelling of leg.

3. On examination- non pitting edema.

4. Investigation-eosinophillia, immunochromatographic card tests-positive.

Management

1. DEC 6 mg /kg daily in 3 divided doses for 12 days. Should be started at low dose and gradually increase the dose.

2. In tropical pulmonary eosinophillia same dose of DEC for 14 days.

Syphilis

Diagnostic tools

1. Painless ulcer in genitalia

2. Rash on the trunk and limbs that may later involve the palms and soles; this is initially macular but evolves to maculopapular or papular forms.

3. Condylomata lata (papules coalescing to plaques) may develop in warm, moist sites such as the vulva or perianal area.

4. Generalised non-tender lymphadenopathy is present in over 50% of patients.

Investigation

1. Direct fluorescent antibody test or PCR to identify Treponema pallidum in serum collected from chancres, or from moist or eroded lesions.

2. VDRL

3. TPHA

Management

1. Antibiotic- choice is penicillin.

Early syphilis(<2 years duration)-a single dose of 2.4 megaunits of intramuscular benzathine benzylpenicillin.

Late syphilis- three doses at weekly intervals.

Neurosyphilis -14 days course of procaine penicillin, supplemented by a 3-day course of prednisolone.

2. Doxycycline if allergic to penicillin except in pregnancy

3. Azithromycin is a further alternative.

N:B: Cure indicated by resolution of clinical sign & decline of non-treponemal test (VDRL) usually to undetectable levels within 6 months of primary syphilis & 12- 18 months of 2ndary syphilis.

Syphilis in pregnancy

Penicillin is choice.

Erythromycin if allergic to penicillin.

Ceftriaxone 250 mg IM for 10 days.

Gonorrhoea

Diagnostic tools

1. History of unprotective sexual exposure.

2. Urethral discharge and dysuria.

3. Investigation-prostatic smear for GNDC (Gram negative dipplococci).

Management

Uncomplicated

Ceftriaxone 500 mg IM plus azithromycin 1 g orally

Cefixime 400mg stat or

Ciprofloxacin 500mg stat or

Ofloxacin 400mg stat

In pregnancy & breastfeeding

Ceftriaxone 500 mg plus azithromycin 1 g IM stat or

Spectinomycin 2 g IM stat.

N: B: It is better to advice prostatic smear for GNDC (Gram negative dipplococci) and urethral discharge for C/S and change antibiotic according to C/S report.

Chlamydial infection

Diagnostic tools

1. History of unprotective sexual exposure.

2. Patient complaints-burning feeling during urination, discharge from the penis or vagina, pain in the lower abdomen, painful sexual intercourse in women, pain in the testicles in men.

Management

Standard regimen

-Azithromycin 1gm single dose or

-Doxycycline 100mg B.D. for 7 days.

Alternative regimen

-Erythromycin 500mg 6 hourly for 7 days or

-Ofloxacin 200 mg 12 hourly for 7 days.

Malaria

For practical management malaria can be categorized as uncomplicated and severe malaria.

Uncomplicated

Diagnostic tools

1. Fever or history of fever within last 48 hours.

And

2. Absence of convincing evidence of other febrile illness

And

3. High index of suspicion based on time, place and person

And

4. Diagnosis is confirmed by presence of asexual form of P. falciparum in blood slide examination or rapid diagnostic test positive.

Management

1. Diet -normal

2. Artemether & Lumefentrin combination (total 6 doses, 2nd dose 8 hours after 1st dose, subsequent doses are 12 hours interval) (1st line drug).

3. Paracetamol to reduce temperature.

Situations where artemether & lumefentrin cannot be given

a) Pregnancy in first trimester

b) Children < 5kg body weight

In these situation Quinine for 7 days.

Dose schedule of Quinine (Jasoquine)

Drug	Weight in kg					
	3-9	10-19	20-29	30-39	40+	Duration
Tab. Jasoquine (Quinine)300mg	¼ Tab. TDS	½ Tab. TDS	1 Tab. TDS	1^1/2Tab.TDS	2Tab.TDS	7 days

Alternative regimen for uncomplicated malaria

- Quinine for 7 days + Tetracycline 7 days (Q7+T7) or
- Quinine for 7 days + Doxycycline 7 days (Q7+D7)

(Tetracycline: 250 mg 6 hourly for 7 days)

(Doxycycline: 100mg 12 hourly for 7 days)

Severe malaria

Diagnostic tools

1. Fever or history of fever within last 48 hours.

   And

2. Diagnosis is confirmed by presence of asexual form of P. falciparum in blood slide examination or rapid diagnostic test positive.

   And

3. One or more of the following clinical or lab features of severity
   - I. Change of behavior, confusion or drowsiness
   - II. Altered consciousness or coma
   - III. Generalized convulsion more than 2 episodes in 24 hours
   - IV. Difficulty in breathing due to acute pulmonary edema or ARDS or deep breathing (acidotic breathing)
   - V. Circulatory collapse (shock)
   - VI. Clinical jaundice
   - VII. Severe prostration (extreme generalized weakness so the patient cannot work or stand or seat without assistance, in small child failure to thrive)
   - VIII. Severe vomiting leading to nothing per oral
   - IX. Bleeding tendency or abnormal spontaneous bleeding
   - X. Severe anaemia (Hb-<5 gm/dl
   - XI. Oliguria or acute renal failure (urine output <400 ml within 24 hours)
   - XII. Laboratory features
     a) Hyperparasitemia (>5% or 2 lac 50 thousand per microliter)
     b) Hypoglycaemia

c) Fluid and electrolyte disturbance (hyponatraemia)
d) Haemoglobinuria
e) Renal impairment (s. creatinine >3 mg/dl)

Management:

1. NG tube feeding 200 ml 2 hourly in sitting posture & maintain the posture for 10 min.
2. Infusion 5% DA 500 cc + inj. Quinine (Jasoquine) (300mg) 4 amp i.v. @ 30 drops /min stat. (suppose pt.'s body wt. 60 kg)

Then

Infusion 5% DA 500 cc + inj. Quinine (Jasoquine) (300mg) 2 amp i.v. @ 30 drops /min 8 hourly.

[Loading dose of Quinine (Jasoquine) is 20mg/kg; maintenance dose is 10mg/kg].

4. Omenix sachet 1 packet dissolve in ½ glass water through NG tube BD

5. Tab. Paracetamol (500mg) 1+1+1

6. Continued catheterization

7. Change the posture 2 hourly

8. Care of mouth, eye & bowel

9. Follow up the pt. with urine output, Blood sugar, GCS.

Tips:

When patient able to take orally then switch from IV to oral therapy. In severe malaria quinine should be given total (IV + oral) 7 days.