CHAPTER 1

ALIMENTARY TRACT

1.1 GASTROINTESTINAL DISORDERS

1.1.1 COLITIS, ULCERATIVE (UC)

K51.9

DESCRIPTION

Idiopathic and chronic intestinal inflammation. Ulcerative colitis (UC) is a mucosal disease that almost always involves the rectum and may extend proximally to all or part of the colon.

Note:
There are more common infective causes of bloody stools e.g. amoebiasis and schistosomiasis, and dysentery e.g. shigellosis, which should be excluded.

GENERAL MEASURES

Surveillance colonoscopy to exclude dysplasia is required every 1–2 years in chronic ulcerative colitis of >10 years duration.
Patients with disease limited to the rectum do not require surveillance colonoscopy.

MEDICINE TREATMENT

Correct electrolyte, haematinic and nutritional deficiencies via the enteral or parenteral route.

Loperamide should not be used during the acute flare due to the risk of toxic megacolon.

Acute episode
Mild to moderate disease**:**

- Sulfasalazine, oral, 1–2 g, 6 hourly.
  - Monitor FBC.

If there is no response to sulfasalazine:
ADD

- Prednisone, oral, 1.5 mg/kg, daily.
  - Once the symptoms have resolved, taper dose by 5 mg/week over a period of three months.

Severe disease:
Admit patient.
Intravenous corticosteroids, e.g.:

- Hydrocortisone, IV, 100 mg 6 hourly.
  Failure to respond to 10 days of intravenous corticosteroids is an indication for an emergency colectomy.

ADD

- Azathioprine, oral, 2 mg/kg daily. Specialist initiated.

Continue treatment until corticosteroids can be tapered.

Local disease: proctosigmoiditis
Patients with limited disease rarely require inpatient treatment. They are usually systemically well.

- Mesalazine, rectal, 1 g daily. Specialist initiated.

AND/OR

- Prednisone, oral, 1.5 mg/kg daily for 14 days.

Maintenance of remission

- Sulfasalazine oral, 500 mg 12 hourly.
  - May be titrated to 1 g 6 hourly.

Patients with recurrent severe attacks to maintain remission:

- Azathioprine, oral, 2 mg/kg daily. Specialist initiated.

REFERRAL

» Confirmation of diagnosis.
» Initiation of long-term therapy.
» Refractory cases.
» Fulminant colitis needs hospital admission and surgery may be required.
» All patients with a severe flare should have abdominal X-rays. Markers of a severe flare are:
  > Tachycardia (> 100 beats per minute).
  > Temperature > 38ºC.
  > > 6 bloody stools per day.
  > Dilated colon or small bowel on X-ray.
» Toxic megacolon (transverse colon diameter > 6 cm on X-ray) requires hospital admission, parenteral fluids, corticosteroids, antibiotics and nasogastric suction. This is a medical emergency and if the colonic dilation does not resolve within 24 hours an emergency colectomy is indicated, as the risk of perforation is high.
» Surgery.

1.1.2 CROHN'S DISEASE (CD)

K50.9

DESCRIPTION

Idiopathic and chronic intestinal inflammation. This is a transmural inflammatory condition affecting mainly the distal ileum or colon, but may affect the entire gastro-intestinal tract. Common complications are intestinal obstruction and abscess formation.

GENERAL MEASURES

Smoking cessation, as smoking is a strong predictor of relapse.
Refer to dietician for dietary advice.

MEDICINE TREATMENT

Antidiarrhoeal medication should not be used in acute flares of inflammatory CD.
Diarrhoea will subside with appropriate care.

After terminal ileal resections, to reduce diarrhoea due to bile salt malabsorption:

- Cholestyramine, oral, 2–8 g daily.

Ileal disease

All patients:

- Vitamin B_{12}, IM, 1 mg, 3 monthly.

Monitor for iron and folate deficiency.

Colonic disease

- Sulfasalazine, oral, 500 mg 12 hourly, up to 1.5 g 8 hourly.
  - Acute attacks: 1–2 g, 4–6 hourly.
  - Maximum dose: 3–4 g daily.

AND

- Prednisone, oral, 1.5 mg/kg daily. Taper dose to lowest possible maintenance dose over 3–4 weeks.

Severe disease

Maintenance of remission:
Sulfasalazine may be useful for maintaining remission in patients with Crohn's colitis but is of no real use in purely ileal CD.

For patients with recurrent attacks of CD or those with extensive disease, i.e. ileum and colon:

- Azathioprine, oral, 2 mg/kg daily. Specialist initiated.

OR

- Methotrexate, oral, 15–25 mg weekly. Specialist initiated.

PLUS
- Folic acid, oral, 5 mg weekly with methotrexate.

Emergency management at specialist facility will include:
» resuscitation with parenteral fluids;
» blood transfusions;
» corticosteroids;
» antibiotics; and
» nasogastric suction as indicated.

Peri-anal disease
There is evidence of recurrence on withdrawal of therapy and prolonged treatment may be indicated.
- Metronidazole, oral, 400–800 mg 8 hourly.

OR
- Ciprofloxacin, oral, 500 mg 12 hourly.

REFERRAL
» For further therapy.
» Peri-anal abscesses/fistula if surgery is required after appropriate assessment.

1.1.3 CONSTIPATION/ FAECAL IMPACTION
K56.4

DESCRIPTION
A condition characterised by a change in usual bowel habits and dry, hard stools.
There is a decreased frequency of bowel action and patients should be assessed individually.

Constipation may have many causes:
» incorrect diet (fibre and fluid);
» lack of exercise;
» pregnancy;
» old age;
» psychogenic disorders;
» chronic use of enemas and laxatives;
» cancer of the bowel;
» certain drugs;
» metabolic;
» endocrine;
» neurogenic;
» lower bowel abnormalities;
» ignoring the urge;
» behavioural problems in children.

GENERAL MEASURES

Dietary advice preferably by dietician.
Dietary measures i.e. balanced diet with unprocessed foods, e.g. cereals, legumes, fruit and vegetables.
Correct dehydration. Ensure adequate fluid intake.
Wheat bran: introduce slowly and take with sufficient fluid. Side-effects include: bloating, cramps and flatulence.
Manual removal of impacted stools.
Encourage regular bowel habits.
Physical exercise.

MEDICINE TREATMENT

Osmotic laxatives

- Lactulose, oral, 10–20 mL daily.
  - Titrate to effect i.e. up to 60 mL daily.

Stimulant laxatives

For short term use only, except in the elderly where long-term treatment may be indicated:

- Sennosides A and B, oral, 7.5–15 mg at night 2–3 times a week for up to 4 weeks.

Polyethylene glycol-based purges

For acute bowel preparation or for chronic constipation on specialist advice.

Saline or phosphate enemas

May occasionally be indicated in acute constipation.

REFERRAL

» For investigation for organic disease.

1.1.4 DIVERTICULOSIS

K57.9

GENERAL MEASURES

Increase unprocessed foods in diet.
Supplement with bran.

MEDICINE TREATMENT

Localised diverticulitis:

- Amoxicillin/clavulanic acid, oral, 875/125 mg 12 hourly.

Severe disease:
- Ampicillin, IV, 1 g 6 hourly.

PLUS
- Gentamicin, IV, 6 mg/kg daily.

PLUS
- Metronidazole, IV, 500 mg 8 hourly.

REFERRAL
» Clinical deterioration or failure to improve.
» Peritonitis
» Fistulae
» Strictures
» Massive haemorrhage

1.1.5 GASTRO-OESOPHAGEAL REFLUX DISEASE (GORD)
K21

DESCRIPTION
A disorder which develops as a consequence of the reflux of gastric and duodenal contents into the oesophagus. It is usually characterised by heartburn and regurgitation. Complications that may develop in severe disease are strictures, ulceration, Barrett's oesophagus and adenocarcinoma of the oesophagus. Two thirds of patients have a normal endoscopy which is termed non-erosive reflux disease (NERD).

GENERAL MEASURES
Dietary advice by dietician.
Weight reduction is recommended if overweight.
All patients with alarm symptoms, i.e. weight loss, haematemesis and melaena, dysphagia, and anaemia, should have an endoscopy at the earliest opportunity.

MEDICINE TREATMENT
Empiric treatment only if there are no alarm symptoms, i.e. no weight loss, no haematemesis and under 45 years of age:
- Ranitidine, oral, 150 mg 12 hourly for 4 weeks.

OR

Proton pump inhibitors (PPIs)
A trial with a PPI confirms acid-related disease. Only if no alarm symptoms:
- Omeprazole, oral, 40 mg daily for 4 weeks.

Recurrence of symptoms
After endoscopic confirmation of disease:
- Omeprazole, oral, 20 mg daily.
  - Decrease to 10 mg daily after 4 weeks.

Barretts' oesophagitis
Restart PPI:
- Omeprazole, oral, 20 mg daily.

Note:
These patients usually need maintenance PPI therapy.
There is no convincing evidence that long-term treatment of Barrett's oesophagitis reduces dysplasia or progression to malignancy.

REFERRAL
For consideration of surgery in:
» young patients who are PPI dependent and will require life-long therapy;
» patients unable to take PPIs;
» patients requiring high doses of PPIs with significant expense;
» patients with large hiatus hernias and "volume reflux";
» a rolling hiatus hernia with obstructive symptoms requires surgery.

1.1.6 HIATUS HERNIA
K44

See section 1.1.5: Gastro-Oesophageal Reflux Disease (GORD).

1.1.7 IRRITABLE BOWEL SYNDROME (IBS)
K58
(Synonyms: spastic colon, irritable colon)

DESCRIPTION
Functional bowel disorder: motility disturbance of the entire gastrointestinal tract (GIT) resulting in recurrent symptoms of pain, constipation and/or diarrhoea and bloating.

GENERAL MEASURES
Reassure patient, after limited investigations, that there is no serious organic disorder.
Dietary advice by dietician.

MEDICINE TREATMENT
Not specifically indicated.
Based on patients' predominant symptoms.
Short-term symptomatic treatment for diarrhoea and/or constipation.

Laxatives only for constipation-specific IBS, see Section 1.1.3: Constipation/Faecal impaction.
Antidiarrhoeals only for diarrhoea-specific IBS, see Section 1.3.3: Diarrhoea, Acute Non-Inflammatory.

Tricyclic anti-depressants may be used as adjuvant therapy.
- Amitriptyline, oral, 25–75 mg daily.
    - Titrate dose as appropriate.

1.1.8 PANCREATITIS, ACUTE

K85

DESCRIPTION

Acute inflammatory condition of the pancreas.

GENERAL MEASURES

Nil per mouth.
Nasogastric suction when persistent vomiting or ileus occurs.

Parenteral fluid replacement to correct metabolic and electrolyte disturbances.
Parenteral nutrition support may be necessary.
Drainage of abscess, psuedocyst, if required.

MEDICINE TREATMENT

For pain:
- Morphine, slow IV, 10–15 mg 4–6 hourly as required.

Acute symptomatic hypocalcaemia
- Calcium gluconate 10%, IV infusion, 10 mL as a bolus over 10 minutes.
    - Follow with 60–120 mL diluted in 1 L sodium chloride 0.9%, administered over 12–24 hours.
    - Monitor serum calcium at least 12 hourly.

If serum magnesium <0.5 mmol/L:
ADD
- Magnesium sulphate, IV infusion, 25–50 mmol in 12–24 hours.
    - 1 mL magnesium sulphate 50% = 2 mmol magnesium.

Antimicrobial therapy
The administration of prophylcatic antibiotics to patients with severe necrotising pancreatitis prior to the diagnosis of infection is not recommended.

For abscess of the pancreas, etc:
Broad spectrum IV antibiotics, e.g.:
- Ampicillin, IV, 1 g 6 hourly.

PLUS
- Gentamicin, IV, 6 mg/kg once daily.

PLUS
- Metronidazole, IV , 500 mg 8 hourly.

REFERRAL
» All patients with moderate or severe pancreatitis.

1.1.9 PANCREATITIS, CHRONIC
K86.1

DESCRIPTION
Chronic inflammatory condition of the pancreas, which results in functional and structural damage. In most patients this is a chronic progressive disease leading to exocrine and endocrine insufficiency.

GENERAL MEASURES
Abstinence from alcohol reduces abdominal pain in the early stages of the disease. Small frequent meals, and restricted fat intake – reduces pancreatic secretion and pain.

Elemental diets (i.e. parenteral or enteral nutrition) in chronically debilitated patients.

When weight loss is not responding to exogenous enzymes and diet, consider supplementation with medium chain triglycerides.
There is a risk of developing cancer of the pancreas. This should be considered in patients who develop worsening pain, new onset diabetes or deterioration in exocrine function.
Dietary advice by dietician.

MEDICINE TREATMENT
Treatment is aimed at:
» pain,
» malabsorption, and
» endocrine function. See section 8.5.2: Type 1 Diabetes mellitus.

Analgesia
See Section 12.1: Chronic Pain
Note:
Pancreatic enzymes may reduce pain by negative feedback on pancreatic secretion.

Malabsorption
Start treatment when >7 g (or 21 mmol) fat in faeces/24 hours while on a 100 g fat/day diet.
Reduce dietary fat to < 25 g/meal.
Supplementation of fat-soluble vitamins may be indicated.

- Lipase, oral, equivalent to lipase 30 000 units per day.

Aim for symptom control and/or 5% of normal faecal fat output.

1.1.10 PEPTIC ULCER

K27

DESCRIPTION

Ulcer in the stomach mucosa (gastric ulcer: GU) or first few centimetres of the duodenum (duodenal ulcer: DU), which penetrates into or through the muscularis mucosa.
Diagnosis is made after investigation, preferably by endoscopy, as all GUs require 4-quadrant biopsy to exclude malignancy.

GUs and complicated DUs, those that have bled, perforated or are recurrent, must be rescoped until the ulcer has healed. *H. pylori* can be assessed at scope by rapid urease testing (RUT) or biopsy.

GENERAL MEASURES

Advise patient to avoid ulcerogenic medications, e.g. NSAIDs.
Advise patient to stop smoking and drinking alcohol.
Dietary advice by dietician.

MEDICINE TREATMENT

***H. pylori* +ve**

The vast majority of GUs and DUs are associated with *H. pylori* infection and eradication therapy is indicated if infection is present. This will greatly reduce the rate of recurrent ulceration. Empiric eradication of *H. pylori* is not recommended.

Proton pump inhibitor (PPI):

- Omeprazole, oral, 40 mg daily.
  - Duodenal ulcer: for 7 days.
  - Gastric ulcer: for 28 days.

AND

H. pylori eradication:

- Amoxicillin, oral, 1 g 12 hourly.

OR

For penicillin allergy:

- Clarithromycin, oral, 500 mg 12 hourly.

PLUS

- Metronidazole, oral, 400 mg 12 hourly for 7 days.

Failure of *H. pylori* eradication (best dealt with in a specialist setting):

- Clarithromycin, oral, 500 mg 12 hourly.

PLUS

- Amoxicillin, oral, 1 g 12 hourly for 7 days.

If resistant to this, refer.

***H. pylori* –ve**
These are usually a consequence of NSAID use.
Stop NSAID until ulcer has healed.
If patient is unable to stop NSAID, refer to specialist.

Proton pump inhibitor (PPI):
- Omeprazole, oral, 40 mg daily.
  - Duodenal ulcer: for 7–14 days.
  - Gastric ulcer: for 28 days.

Resistant disease
Ulcer not healing.
High-risk patients, i.e. poor surgical risk and the elderly or concomitant disease. Maintenance therapy with PPI, e.g.:
- Omeprazole, oral, 20 mg daily. Specialist initiated.

1.2 HEPATIC DISORDERS

1.2.1 HEPATITIS, NON-VIRAL

K70.1/K71/K75.4
* Notifiable if caused by agricultural chemicals and insecticides.

DESCRIPTION

Any form of hepatitis not caused by the common hepatotropic viruses.

> Liver biopsy is indicated if hepatitis persists or diagnosis is unclear.

GENERAL MEASURES

Diet: restrict protein if features of liver failure are present. Excessive protein restriction may accentuate catabolism.
Avoid alcohol.
Avoid other hepatotoxic agents.
Monitor blood glucose regularly because hypoglycaemia is common.

MEDICINE TREATMENT

Hepatitis due to infections
Antibiotic therapy based on culture.

Alcohol-induced hepatitis
Even if no bleeding:
- Vitamin K_1, IM/IV, 5–10 mg daily for 10 days
- Thiamine, oral, 100 mg daily

Other vitamins if indicated.

Drug-induced hepatitis
Stop all potentially hepatotoxic medication immediately.

Auto-immune hepatitis
Patients with hepatitis persisting with negative viral markers and no hepatotoxins. Biopsy and autoimmune markers are necessary to make the diagnosis.
- Prednisone, oral, 0.5–1 mg/kg daily
  - Taper dose to a suitable maintenance dose.

PLUS
- Azathioprine, oral, 0.5–1 mg/kg daily.

REFERRAL
» Where patients cannot be managed locally or biopsy cannot be done, i.e. diagnosis is unclear.
» Non-resolving hepatitis.
Refer timeously before extensive liver damage occurrs.

1.2.2 LIVER FAILURE
K72.9

GENERAL MEASURES
Patient education.
Avoid hepatotoxic drugs and alcohol.
Rest and reduced physical activity are recommended.
Normal diet. Protein restriction indicated only when encephalopathy is evident. Severe protein restriction may accentuate catabolism. Use increments of 20 g protein per day as tolerated.
Monitor blood glucose regularly because hypoglycaemia is common.
Correct electrolyte disturbances.
Exclude GI bleed as precipitant.
Avoid any measure, e.g. drugs, that may worsen or precipitate functional deterioration.
Avoid vigorous paracentesis.
Exclude infection as precipitant, especially spontaneous bacterial peritonitis.

MEDICINE TREATMENT
On admission to change pH of large bowel:
- Lactulose, oral, 10–30 mL immediately.

Thereafter, to attain 2–3 soft stools a day:
- Lactulose, oral, 10–30 mL 8 hourly.
  - Titrate dose to 2–3 soft stools a day.

Consider:
- Vitamin K_1, IM/IV, 5–10 mg daily.

Other vitamins if indicated.
Multivitamin supplements should be considered and may be indicated.

REFERRAL
» All cases with severe acute or advanced chronic liver failure.
» Where a liver transplant is to be considered.

1.2.3 PORTAL HYPERTENSION AND CIRRHOSIS
K76.6

DESCRIPTION
The complications of portal hypertension are:
» variceal bleeds
» ascites and fluid overload
» encephalopathy
» spontaneous bacterial peritonitis in patients with ascites

GENERAL MEASURES
Ascites: salt restriction, i.e. < 2 g/day.
Monitor weight regularly.
Bed rest.
Encephalopathy: low protein diet. Severe protein restriction may accentuate catabolism. Use increments of 20 g protein per day as tolerated.
Exclude infection, high protein load, occult bleed, sedatives and electrolyte disturbances.
Variceal bleeding: endoscopic sclerotherapy and/or banding.

MEDICINE TREATMENT

Ascites, oedema
If no response to strict bed rest after 2–3 days:
- Spironolactone, oral, 50–200 mg daily.
  - Titrate to higher dosages with caution.
  - Maximum dose: 400 mg daily.
  - May cause hyperkalemia.
  - Can be combined with furosemide.
  - Potassium supplementation is not necessary.

AND

If there is no response to spironolactone or if there is gross fluid retention:

- Furosemide, oral, 20–40 mg daily, initially for a few days to increase natriuresis.
  - Titrate carefully to desired effect as rapid fluid shift may precipitate liver failure.
  - Optimal dose: 160 mg daily.
  - Measure response to diuretics. Aim for weight loss of:

300–500 g/day	patients without oedema
800–1 000 g/day	patients with peripheral oedema

Resistant ascites

Patients not responding to optimal diuretic therapy, sufficient salt restriction and avoiding NSAIDs.

These patients may require regular large volume paracentesis, i.e. > 5 L, as outpatients, if possible.

Protect against haemodynamic collapse.

Crystalloid replacement.

Large-volume ascites

Large volume paracentesis is the method of choice as it is faster, more effective and has fewer adverse effects compared to diuretics.

Diuretics are indicated as maintenance therapy to prevent recurrence of ascites.

Encephalopathy

- Lactulose, oral, 10–30 mL 8 hourly.

Oesophageal varices

To reduce the risk of bleeding:

- Propranolol, oral 10–20 mg 12 hourly.

1.2.4 HEPATITIS, VIRAL

B19.9

* Notifiable disease

DESCRIPTION

Hepatitis caused by one of the hepatotropic viruses, hepatitis A, B, C and E. Hepatitis A and E only cause acute hepatitis, whilst B and C cause acute and chronic hepatitis.

GENERAL MEASURES

Acute hepatitis

Bed-rest until acute phase is over.

Avoid alcohol during the illness and for at least 6 months after clinical recovery.
In cases of hepatitis B serologically screen sexual contacts. If they are seronegative (Anti-HBs negative) then they should receive hepatitis B active immunisation.

MEDICINE TREATMENT

For nausea and vomiting:

- Metoclopramide, IV/oral, 10 mg 8 hourly as required.

Hepatitis B virus: prophylaxis following exposure e.g. needle stick injury
Persons at risk can be protected by passive immunisation with hyper immune serum globulin prepared from blood containing anti-HBs.
It is essential that all categories of healthcare workers (HCW) who are at risk of exposure, including cleaning staff, be fully vaccinated against hepatitis B.

All exposure incidents must be adequately documented for possible subsequent compensation.

Recommended post-exposure prophylaxis for hepatitis B in HCW.
HbsAg: hepatitis B surface antigen HbsAb: hepatitis B surface antibody
HBIG: hepatitis B immune globulin

	Source patient		
Vaccination status and antibody response status of HCW	HBsAg positive	HBsAg negative	HBsAg unknown
Unvaccinated or vaccination incomplete	• HBIG, IM, 500 units* Hep B vaccine (3 doses at monthly intervals)	Initiate Hep B vaccination (month 0, 1 and 6)	• HBIG, IM, 500 units* Hep B vaccine (3 doses at monthly intervals)
Vaccinated AND HBsAb > 10 units/mL[#]	No treatment	No treatment	No treatment
Vaccinated AND HBsAb < 10 units/mL	• HBIG, IM, 500 units * Repeat Hep B vaccine (3 doses at monthly intervals)	No treatment	• HBIG, IM, 500 units* Repeat Hep B vaccine (3 doses at monthly intervals)

* HBIG and first dose of vaccine to be given simultaneously, but at different sites.
[#] If the delay in obtaining HBsAb results is more than 24 hours initiate treatment as for vaccinated AND HBsAb < 10 units/mL.

1.2.5 LIVER ABSCESS, PYOGENIC

K75.0

DESCRIPTION

Focal bacterial infection of the liver with pus, usually polymicrobial.

GENERAL MEASURES

Drainage is essential in all cases. This should preferably be done percutaneously by inserting a catheter under ultrasound guidance.

MEDICINE TREATMENT

Empiric antibiotic therapy

- Benzylpenicillin (penicillin G), IV, 2 million units 6 hourly.

PLUS

- Gentamicin, IV, 6 mg/kg daily.

PLUS

- Metronidazole, oral, 400 mg 8 hourly.

Duration of antibiotic therapy is ill-defined, but may need to be for as long as 12 weeks in cases of multiple abscesses. Continue until drainage is complete and CRP has returned to normal values. Ultrasound resolution is very slow and is not useful for monitoring response to therapy.

1.2.6 LIVER ABSCESS, AMOEBIC

A06.4

DESCRIPTION

Focal hepatic infection due to *E. histolytica*. Only about a third of cases have concomitant amoebic colitis. Diagnosis can be excluded if the serological test is negative. It is essential to exclude pyogenic infection (a diagnostic aspirate should be taken under ultrasound guidance in all cases where there is doubt).

GENERAL MEASURES

Drainage is recommended for abscesses that are large, i.e. >10 cm diameter, involve the left lobe or are near the surface of the liver. Drainage can be achieved by percutaneous aspiration under ultrasound guidance.

MEDICINE TREATMENT

- Metronidazole, oral, 400 mg 8 hourly for 10 days.

1.2.7 ACUTE CHOLECYSTITIS AND ACUTE CHOLANGITIS

GENERAL MEASURES
Surgical drainage / cholecystectomy according to indication and/or patient's condition.

MEDICINE TREATMENT
Acute cholecystitis
Mild and asymptomatic cases without risk factors may not require antibiotic treatment. If signs of infection present and/or risk factors for severe disease present:
» Elderly patients (older than 60 years)
» Co-morbidity
» Immune compromise

Acute cholecystitis and acute cholangitis
- Ampicillin, IV, 1 g 6 hourly.

PLUS
- Gentamicin, IV, 6 mg/kg daily.

PLUS
- Metronidazole, IV, 500 mg 8 hourly.

REFERRAL
» Clinical deterioration or failure to improve.
» Fistulae or perforation.
» Need for complicated surgery.

1.3 DIARRHOEA, GASTROINTESTINAL

1.3.1 CHOLERA
A00.9
*This is a notifiable disease.

DESCRIPTION
Diarrhoea due to *Vibrio cholerae*, often in outbreaks.

GENERAL MEASURES
Rehydration is the cornerstone of management. This should be done with oral rehydration solution (ORS) unless the patient is vomiting or profoundly dehydrated.

MEDICINE TREATMENT
- Ciprofloxacin, oral, 1 g immediately as a single dose
  - Adjust according to the sensitivity of the isolate responsible for the local epidemic.

1.3.2 ACUTE INFLAMMATORY DIARRHOEA (DYSENTERY)

A03.9

DESCRIPTION

Diarrhoea with neutrophils, blood and/or mucus. Causes include shigella, salmonella and campylobacter.

GENERAL MEASURES

Rehydration is the cornerstone of management. This should be done with oral rehydration solution (ORS) unless the patient is vomiting or profoundly dehydrated.
Stool culture is advised.

MEDICINE TREATMENT

> Loperamide is contraindicated as it may result in toxic megacolon.

Antibiotic therapy
Consider in severe cases or significant underlying disease.

- Ciprofloxacin, oral, 500 mg 12 hourly for 3–7 days.

REFERRAL

» Persistent diarrhoea with blood and mucus for longer than 2 weeks.

1.3.3 DIARRHOEA, ACUTE NON-INFLAMMATORY

A04.1

DESCRIPTION

Diarrhoea without blood or mucus. Common causes include viruses and enterotoxigenic strains of *E. coli*.

GENERAL MEASURES

Rehydration is the cornerstone of management. This should be done with oral rehydration solution (ORS) unless the patient is vomiting or profoundly dehydrated.

MEDICINE TREATMENT

- Loperamide, oral, 4 mg immediately, followed by 2 mg after each loose stool.
  - Maximum dose: 16 mg daily.

1.3.4 DIARRHOEA, ANTIBIOTIC-ASSOCIATED

A04.7

DESCRIPTION

Diarrhoea caused by altered bowel flora due to antibiotic exposure. Severe cases present with pseudomembranous colitis. Toxins produced by *Clostridium difficile* can be demonstrated on stool samples.

GENERAL MEASURES

The most important aspect of management is discontinuing antibiotics.
Rehydration may be necessary. This should be done with oral rehydration solution (ORS) unless the patient is vomiting or profoundly dehydrated.
Surgery for bowel perforation.

MEDICINE TREATMENT

Loperamide is contraindicated as it may result in toxic megacolon.

If diarrhoea does not settle on antibiotic withdrawal or if pseudomembranous colitis is present:

- Vancomycin, oral, 125 mg 6 hourly.

OR

- Metronidazole, oral, 800 mg 8 hourly for 10 days.

1.3.5 AMOEBIC DYSENTERY

A06

DESCRIPTION

Diarrhoea with blood and/or mucus due to *E. histolytica*.

GENERAL MEASURES

Rehydration may be necessary. This should be done with oral rehydration solution (ORS) unless the patient is vomiting or profoundly dehydrated.
Surgery for bowel perforation.

MEDICINE TREATMENT

Loperamide is contraindicated as it may result in toxic megacolon.

- Metronidazole, oral, 800 mg 8 hourly for 10 days.

1.3.6 GIARDIASIS

A07.1

DESCRIPTION

Infection with the protozoan parasite, *G. lamblia* which colonises the proximal small intestine.

GENERAL MEASURES

Fluid and electrolyte replacement in severe diarrhoea.

MEDICINE TREATMENT

- Metronidazole, oral, 400 mg 8 hourly for 5 days.

1.3.7 TYPHOID

A01.0

See section 9.9: Typhoid fever.

1.3.8 PERITONITIS

K65

DESCRIPTION

Infection of the peritoneum, usually secondary to a surgical cause such as perforated bowel. In this setting polymicrobial infection with anaerobes and Enterobacteriaceae are usually found.

Primary or spontaneous bacterial peritonitis is much less common and usually complicates ascites in patients with portal hypertension. This is not usually polymicrobial but due generally to Enterobacteriaceae such as *E. coli*. Spontaneous bacterial peritonitis is often culture-negative but is diagnosed by ascitic neutrophil count >0.25 x 10^9/L (250 cells/mm^3).

GENERAL MEASURES

Secondary peritonitis

Intravenous fluids and nasogastric suction.

Prompt surgical intervention is essential.

MEDICINE TREATMENT

Empiric antibiotic therapy

For surgical causes of peritonitis:

- Benzylpenicillin (penicillin G), IV, 2 million units every 6 hourly.

PLUS

- Gentamicin, IV, 6 mg/kg daily.

PLUS

- Metronidazole, IV, 500 mg 8 hourly.

As soon as patient can tolerate oral medication:

- Metronidazole, oral, 400 mg 8 hourly.

For spontaneous bacterial peritonitis:

- Ceftriaxone, IV, 1 g daily.

Switch to oral therapy when clinically appropriate according to culture or treat with:

- Ciprofloxacin, oral, 500 mg 12 hourly.
  - Total duration of therapy: 14 days.

CHAPTER 2

BLOOD AND BLOOD FORMING ORGANS

2.1 ANAEMIA, APLASTIC

D61.9

DESCRIPTION

Pancytopenia due to a hypoplastic bone marrow.
Clinical features:

» pallor,
» petechiae,
» purpura, and
» bleeding

with frequent or severe infections.

MEDICINE TREATMENT

If neutropenic and febrile, see section 2.7: Febrile Neutropenia.

REFERRAL

» Discuss all cases of suspected aplastic anaemia with a specialist.

Stabilise patient, if necessary, with blood products before transport but after consultation with an expert.

2.2 ANAEMIA, CHRONIC DISORDER

D63

DESCRIPTION

Anaemia due to chronic inflammation. This is characteristically a normochromic normocytic anaemia. Common causes of anaemia of chronic disorder include:

» malignancy, e.g. haematological or solid tumours,
» autoimmune disorders, e.g. rheumatoid arthritis,
» acute or chronic infections, e.g. HIV and TB,
» chronic kidney disease, and
» chronic rejection of solid-organ transplantation, etc.

TREATMENT

Treat the underlying condition.
Transfusion is seldom necessary.
Do not treat with iron, folic acid or vitamin B_{12} unless there is a documented deficiency.

2.3 ANAEMIA, HAEMOLYTIC

D59

DESCRIPTION

Anaemia due to destruction of red blood cells. Destruction may be due to:

» Extracellular factors such as auto-immunity or mechanical factors, e.g. disseminated intravascular coagulation (DIC), hypersplenism, medications.
» Abnormalities of the cell membrane, e.g. hereditary spherocytosis.
» Enzymes, e.g. G6PD deficiency.
» Haemoglobin, e.g. sickle cell anaemia, thalassaemia.

Investigations

Evidence of haemolysis: anaemia, reticulocytosis, decreased haptoglobin, increased lactate dehydrogenase (LDH) and unconjugated hyperbilirubinaemia.
Coombs' test (direct antiglobulin) is usually positive with autoimmune haemolysis.

GENERAL MEASURES

Treat the underlying cause.
Do not transfuse prior to appropriate investigations, unless anaemia is severe.
Coombs-positive haemolytic anaemia may be technically difficult to cross match.
Efficacy of transfusion is limited by the shortened red cell survival due to haemolysis.
In G6PD deficiency, avoid drugs known to cause haemolysis, including aspirin, sulphonamides (including cotrimoxazole), dapsone and primaquine.
In patients with cold agglutinins all transfusions must be given through a blood warmer to avoid cold-induced haemolysis.

MEDICINE TREATMENT

All patients:
Because of high red cell turnover, supplement with:

- Folic acid, oral, 5 mg daily.

Autoimmune haemolytic anaemia

Treat under specialist supervision.

- Prednisone, oral, 1–2 mg/kg daily, initial dose.
  - When a satisfactory response is obtained with recovery of the haemoglobin and a decrease in LDH serum concentrations, taper dose over a period of 4 weeks to 30 mg daily.
  - Thereafter further reduction should be slower to prevent disease recurrence.

  Prednisone treatment can be stopped when the Coombs' reaction becomes negative.

If inadequate response:
ADD
- Azathioprine, oral, 2.5 mg/kg daily.
  - Titrate to Hb response.
  - May be required for several months
  - Monitor for neutropenia.

Patients who fail medicine treatment should be considered for splenectomy.

REFERRAL/CONSULTATION
» No response to medicine treatment.
» Other causes of haemolytic anaemia.

2.4 ANAEMIA, IRON DEFICIENCY
D50.9

DESCRIPTION
Anaemia due to iron deficiency. Common causes of iron deficiency are chronic blood loss or poor nutritional intake.

Hypochromic microcytic anaemia
Investigations
Assess for a haematological response to iron therapy.

GENERAL MEASURES
Identify and treat the cause.
Dietary adjustment.

MEDICINE TREATMENT
Oral iron supplementation
Reticulocytosis begins on the 3rd or 4th day after therapy, peaks at approximately day ten and lasts between 12 and 21 days.
The expected haemoglobin rise is approximately 2 g/dL every 3 weeks.

Treatment

- Iron, elemental, oral, 100–200 mg daily with a meal, e.g.:
  Ferrous sulphate compound, oral, BPC 170 mg daily with food.
  After the haemoglobin has returned to normal, treatment should be continued for 6 months in order to replenish the iron stores adequately.

Prophylaxis

For example during pregnancy:

- Ferrous sulphate compound, oral, BPC 170 mg daily with meals (65 mg elemental iron).

Consider the following if there is failure to respond to iron therapy:

» non-adherence,
» continued blood loss,
» wrong diagnosis,
» malabsorption, and
» mixed deficiency; concurrent folate or vitamin B_{12} deficiency.

Parenteral iron

Parenteral iron is seldom required.
The use of parenteral iron may be associated with anaphylaxis.
Parenteral iron is **only** indicated when oral iron is:

» ineffective, e.g. malabsorption or patients on haemodialysis and erythropoietin therapy, or
» not tolerated.

In people who require repeated therapy, the intravenous route is preferred.
Where a once-off dose is required, give intramuscularly. Minimum required dose is 250 mg of iron per gram of Hb below normal.
Use in consultation with a specialist.

- Iron sucrose, IV.
  - Total dose = weight (kg) x [11 g/dL – actual Hb (g/dL)] x 2.4 + 200 mg.
  - Maximum daily dose: 200 mg.
  - Administer over 30 minutes in 200 mL sodium chloride 0.9%.
  - Repeat every second day until the total dose is given.

Ensure that the correct formulation is given as some preparations can be given IM, or IV only, or both.
Resuscitation equipment should be ready to manage anaphylaxis.

Blood transfusion
Indicated in patients with:
» anaemia leading to cardiac failure or severe dyspnoea,
» active, ongoing bleeding, or
» where correction of anaemia to at least 7 g/dL is required prior to performing an urgent invasive procedure or surgery.

2.5 ANAEMIA, MEGALOBLASTIC
D53.1

DESCRIPTION
Anaemia caused by a deficiency of folate and/or vitamin B_{12}.

Investigations
Elevated MCV (mean corpuscular volume) and MCH (mean corpuscular haemoglobin).
Macro-ovalocytes on blood smear; polysegmentation of neutrophils, thrombocytopenia with giant platelets.
Decreased serum vitamin B_{12} or red blood cell folate.
Pancytopenia in severe cases.
Intrinsic factor antibodies in vitamin B_{12} deficiency, and anti-parietal cell antibodies in pernicious anaemia.

GENERAL MEASURES
Dietary modifications to ensure adequate intake of folate and vitamin B_{12}.
Identify and treat the underlying cause, e.g. antibiotics for intestinal overgrowth with bacteria.

MEDICINE TREATMENT
After blood samples for RBC, folate and vitamin B_{12} levels have been taken, start with folic acid and vitamin B_{12}.
Monitor serum potassium and replace if necessary.

> Give vitamin B_{12} and folic acid together until the test results are available as giving folic acid alone in patients with a B_{12} deficiency may precipitate a permanent neurological deficit.

Adjust management according to results.

Folic acid deficiency
- Folic acid, oral, 5 mg daily until haemoglobin returns to normal. Prolonged treatment may be required for malabsorption states.

Vitamin B_{12} deficiency

- Vitamin B_{12}, IM.
  - 1 mg daily for 5 days, then weekly for a further 3 doses
  - Follow with 1 mg every second month for life in patients with pernicious anaemia, except in patients with clearly modifiable nutritional deficiency.

Note:
Response to treatment is associated with an increase in strength and improved sense of well-being.
Reticulocytosis begins 3–5 days after therapy and peaks at about day 7. The anaemia is corrected within 1–2 months. The white cell count and platelets normalise in 7–10 days. As there is an increase in red blood cell production, short-term iron and folic acid supplementation is also recommended.

Consider the following if there is failure to respond:
» co-existing folate and/or iron deficiency,
» infection,
» hypothyroidism,
» myelodysplasia,
» incorrect diagnosis,and
» drug-induced, e.g. hydroxyurea, stavudine and zidovudine.

Prophylaxis
Vitamin B_{12} is indicated for patients after total gastrectomy or ileal resection.

- Vitamin B_{12}, IM, 1 mg every second month for life.

Indications for folic acid:
» Chronic inherited haemolytic anaemias, e.g. sickle cell anaemia, thalassaemia.
» Myeloproliferative disorders.
» Exfoliative skin disorders.
» Increased demands, e.g. pregnancy, chronic haemodialysis.

- Folic acid, oral, 5 mg daily.

2.6 ANAEMIA, SICKLE CELL

D57

DESCRIPTION

Homozygous sickle cell anaemia (HbSS: HbS > 50–100%). Individuals with sickle cell trait have < 50% HbS and are generally asymptomatic.
The disease is characterised by various crises: vaso-occlusive, aplastic, megaloblastic and sequestration crises, and infection.

The pain crisis/vaso-occlusive crisis
The most common type of crisis is characterised by acute episodes of severe, agonising and relentless pain. The pain may be localised to a single long bone, typically in the juxta-articular area. It can be symmetrical in several limbs or involve the axial skeleton, i.e. lumbar spine, ribs or pelvis, abdomen, chest or organ systems.

Investigations
The diagnosis is suspected from the history, peripheral blood examination, and/or screening tests for sickling.
Diagnosis is confirmed on haemoglobin electrophoresis.

GENERAL MEASURES
Bed rest and/or hospitalisation.

MEDICINE TREATMENT
- Oxygen.

All patients:
- Folic acid, oral, 5 mg daily.

Analgesia
For severe pain:
- Morphine, IV, 10 mg 4 hourly.

Fluids
Keep well hydrated with intravenous fluids.

REFERRAL
» All for chronic management in a specialised centre.

2.7 FEBRILE NEUTROPENIA
D70

DESCRIPTION
Febrile neutropenia is defined as an absolute neutrophil count of < 0.5 x 10^9/L with a temperature of greater than 38°C for > 1 hour.

This is a **medical emergency** as these patients can rapidly develop features of severe sepsis (multi-organ failure and/or hypotension).

GENERAL MEASURES
Treat the underlying cause of neutropenia, if applicable.
Withdraw any drug that may cause neutropenia.

Take blood cultures before starting antimicrobial therapy. Once culture results are available, adjust treatment to the most appropriate narrow spectrum agent.

MEDICINE TREATMENT

For patients with febrile neutropenia within 48 hours of admission:

- 3rd generation cephalosporin, e.g.:
- Ceftriaxone, IV, 1 g daily.

PLUS

- Gentamicin, IV, 6 mg/kg daily.

If IV line infection is suspected as the cause at any stage:

ADD:

- Vancomycin, IV, 20 mg/kg/dose 12 hourly.
  - Monitor trough levels after the third dose.
  - Adjust dose to maintain a trough level of 15–20 micromol/L.

If fever develops after 48 hours of admission:
Choice will depend on local susceptibility patterns. One or more of the following antibiotics/classes must be available:

- Piperacillin/tazobactam, IV, 4.5 g 8 hourly **or** cefepime, IV, 1 g 12 hourly.

OR

- Carbapenem with activity against Pseudomonas, e.g.:
- Meropenem, IV, 1 g 8 hourly **or** Imipenem, IV, 500 mg 6 hourly.

Note:
Ertapenem is not recommended because it is not effective for pseudomonas species which are important pathogens in this setting.

If no response after 5–7 days:

ADD

- Amphotericin B, IV, 1 mg/kg daily in dextrose 5 % over 4 hours.
  - Ensure adequate hydration to minimise nephrotoxicity.
  - Regular, e.g. 3 times a week, monitoring of potassium, magnesium and renal function is essential.

Duration of therapy:
If neutrophil count increases to $> 0.5 \times 10^9$/L, continue for 2 days after fever has settled.
If neutrophil count remains $\leq 0.5 \times 10^9$/L, continue for 7 days after fever has settled.

REFERRAL/CONSULTATION

» All cases – consult with haematologist/oncologist.

2.8 MYELODYSPLASTIC SYNDROMES

D46

DESCRIPTION

A group of disorders characterised by refractory cytopenias due to bone marrow failure. Anaemia is very common and there is a risk of developing acute leukaemia.

Investigations

Evidence of cytopenia, with normal B_{12} and folate levels and substantial morphological dysplasia on the blood smear.
Bone marrow examination confirms dysplasia of the blood elements and the presence of cytogenetic abnormalities.

TREATMENT

Transfusion should ideally be with leucodepleted red cells to delay immunisation, as these patients require frequent transfusions.
Bone marrow transplantation can be curative in selected patients.
If neutropenic and febrile, See section 2.7: Febrile Neutropenia.

REFERRAL

» All patients for further investigation and management.

2.9 BLEEDING DISORDERS

GENERAL PRINCIPLES

A bleeding tendency may result from:

» a coagulation defect (congenital/acquired),
» a vessel wall defect, or
» a platelet defect (quantitative/qualitative).

A careful and detailed history, thorough examination and review of relevant laboratory investigations will allow differentiation between these three categories, as the management of each of these groups differs significantly. Early consultation with a haematologist or a clinician with expertise in the handling of such patients is advisable.
Patients with a chronic bleeding tendency should be advised to wear a medic alert bracelet which clearly mentions the type of disorder he/she suffers from, e.g. Severe Haemophilia A, Factor VIII <1%, no inhibitors.

2.9.1 HAEMOPHILIA A AND B, VON WILLEBRAND'S DISEASE

D66/7/8

DESCRIPTION

Haemophilia A, haemophilia B and von Willebrand's disease are chronic bleeding disorders caused, respectively, by a lack of clotting factor VIII, clotting factor IX and von Willebrand factor (VWF, a carrier protein for factor VIII). Presentation depends on severity of the condition (see classification below). Complications include
haemarthrosis with later chronic arthropathy, intracranial haemorrhage, soft tissue and muscle haematomas. Pain/tingling in a joint suggests bleeding into the joint in a known haemophiliac.

Subclassification (factor VIII and IX deficiency):

CLASS	CLOTTING FACTOR	% OF NORMAL	SIGNS
Mild	VIII or IX	5–25%	Occasional bleeds
Moderate	VIII or IX	2–5%	
Severe	VIII or IX	< 1–2%	Trauma/spontaneous bleeds

Investigations
Prolonged partial thromboplastin time (PTT).
Factor VIII or factor IX concentration < 25% of normal activity.
Prolonged bleeding time (Von Willebrand's).

Patient with factor VIII deficiency should be tested annually for factor VIII inhibitor.

GENERAL MEASURES

Haemophilia register.
Ideally, patients should attend a specialised haemophilia centre with a dedicated multi-disciplinary health care team.
Medic alert bracelet.
Dental care (see below for management of tooth extraction).
Avoid contact sport.

Acute bleeds into joints
Apply ice packs.
Bed rest.
Rest the affected joint/limb until pain free and no further bleeding.
No weight bearing.
Splint (no circumferential casting).

MEDICINE TREATMENT

For mild to moderate pain:

- Paracetamol, oral, 1 g 4–6 hourly when required to a maximum of 4 doses per 24 hours.

If needed:
ADD

- Tramadol, oral, 50mg, 6 hourly.

For severe pain:

- Morphine, IV, 10 mg 4 hourly.

Exercise great caution when taking blood specimens.
Taking blood from femoral veins is absolutely contra-indicated.

Avoid IM injections.
Avoid aspirin and NSAIDS.

HAEMOPHILIA WITH NO INHIBITORS
The dose of the factor VIII and IX is individualised as it is dependent on body mass, severity of the condition, and the nature and site of the bleeding.

Factor VIII deficiency (with no inhibitor present)

Bleeding event	Target plasma level of factor VIII	Duration of therapy
Minor nose and mouth bleeds, trauma with no bleeding, painless haematuria.	30%	At least 1 day.
Major oral bleeds (e.g. molar tooth extractions), severe throat and tongue bleeding, bleeding from calf and forearm.	40-50%	3–4 days or until the wound has healed well.
Head trauma, severe nose bleeds, any internal bleeding, major operations, any trauma with bleeding or with serious injuries.	60-100%	3–4 days or until the wound has healed well.

- Lyophilised factor VIII concentrate, slow IV infusion.
  Required units = body weight (kg) X desired factor increase (%) X **0.5**

Desired factor increase (%)	**Body weight (kg)**		
	50 kg	**60 kg**	**70 kg**
30%	750	900	1 050
40%	1 000	1 200	1 400
50%	1 250	1 500	1 750
60%	1 500	1 800	2 100
100%	2 500	3 000	3 500

Factor IX deficiency (with no inhibitor present)

Bleeding event	Target plasma level of factor IX	Duration of therapy
Minor nose and mouth bleeds, trauma with no bleeding, painless haematuria	30%	At least 1 day
Major oral bleeds(e.g. molar tooth extractions), severe throat and tongue bleeding, bleeding from calf and forearm	30–50%	3–4 days or until the wound has healed well
Head trauma, severe nose bleeds, any internal bleeding, major operations, any trauma with bleeding or with serious injuries,	50–75%	3–4 days or until the wound has healed well

- Lyophilised factor IX concentrate, slow IV infusion
  Required units = body weight (kg) X desired factor increase (%) X **1.2**

Desired factor increase (%)	**Body weight (kg)**		
	50 kg	**60 kg**	**70 kg**
30%	1 800	2 160	2 520
50%	3 000	3 600	4 200
60%	4 500	5 400	6 300
100%	6 000	7 200	8 400

Dental extraction
Check that inhibitors are absent.
In haemophilia A:

- Lyophilised factor VIII concentrate, IV, 40 units/kg immediately before extraction.

In haemophilia B:

- Lyophilised factor IX concentrate, IV, 40 units/kg immediately before extraction.

- Tranexamic acid, 250 mg dissolved in 10 mL of water.
  - Rinse mouth for 2 minutes 6 hourly.

Mucous membrane bleeds

- Tranexamic acid, oral, 1 g 6 hourly.
  - Contraindicated in haematuria or in patients with thrombotic tendencies.

In mild von Willebrand's disease or established responders of mild factor VIII deficiency:

- Desmopressin, IV, 0.3 mcg/kg in at least 30 mL sodium chloride 0.9% administered over 30 minutes.

Emergency treatment while awaiting transfer, if indicated

If serious bleeding with known haemophilia, and no factor VIII available:

- Fresh frozen plasma, IV, 10–20 mL/kg.

HAEMOPHILIA WITH INHIBITORS

Refer for assessment and planning with a haematologist.

- Factor VIII inhibitor-bypassing activity (FEIBA) – under haematologist supervision only.

VON WILLEBRAND'S DISEASE

Mild bleeding

E.g. epistaxis and menorrhagia.

Antifibrinolytics, e.g.:

- Tranexamic acid, oral, 1 g 6 hourly.

Recurrent menorrhagia can also be treated effectively with oral contraceptives.

More severe mucous membrane bleeding

For mild von Willebrand's Disease, which occurs in 80% of patients:

- Desmopressin, IV, 0.3 mcg/kg in at least 30 mL sodium chloride 0.9% administered over 30 minutes.

Note:

Desmopressin is not effective in type 3 and the majority of type 2 von Willebrand's disease.

Intermediate-purity factor VIII concentrates, which contain both von Willebrand factor and factor VIII, may be used for patients with very low von Willebrand factor levels.

During surgery or after major trauma, patients should receive:

- Cryoprecipitate, IV, 1 unit/10 kg 12 hourly.

OR

- Lyophilised factor VIII concentrate, IV, 30–50 units/kg/dose given every 12 hours.
  - Continue for 48–72 hours to ensure optimal haemostasis.
  - For major surgical procedures, use for 7–10 days.

Antifibrinolytic agents may be used in combination with desmospressin or von Willebrand factor containing concentrates (cryoprecipitate or factor VIII) to treat bleeding episodes.

REFERRAL

» All cases with **suspected** haemophilia (prolonged PTT and normal INR) to a haemophilia treatment centre, for assessment, genetic counselling and planning of management.
» Patients with proven antibodies against factor VIII.
» For further replacement, complex situations and complications in consultation with a haematologist.

2.10 IMMUNE THROMBOCYTOPENIC PURPURA (ITP)

D69.3

DESCRIPTION

A common bleeding disorder due to immune destruction of platelets. To diagnose ITP, isolated thrombocytopenia is present (rest of the complete blood count, including an examination of the peripheral blood smear, is entirely normal). Clinically apparent associated conditions, drugs (e.g. penicillins, cephalosporins, quinine, rifampicin and heparin), or other agents that may cause thrombocytopenia are NOT present. Patients with suspected ITP should be tested for SLE and for HIV infection.

Investigations

Thrombocytopenia with normal white cell count and red cell series. Anaemia may be present due to blood loss.
Peripheral blood smear to exclude RBC fragments. Smear may show large platelets.
Do INR and aPTT, which should be normal in ITP.
If there is a poor response to treatment do a bone marrow biopsy.

GENERAL MEASURES

Avoid:

» medication that affects platelet function, e.g. NSAIDs and aspirin,
» platelet transfusions unless life-threatening bleeds,
» dental procedures in acute phase, and
» IM injections.

Reassure the patient that resolution usually occurs in acute ITP.
Medic alert bracelet.
Platelet transfusions may be given if surgery is required or in life-threatening bleeding.

MEDICINE TREATMENT

Acute ITP

- Prednisone, oral, 2 mg/kg daily.
  - Taper dose once response is achieved, usually within 10–14 days.
  - Therapy may be required for a few months before prednisone is eventually discontinued.
  - Also indicated for HIV-associated immune thrombocytopenia. Also start combination antiretroviral therapy urgently in these patients.

Platelet transfusions

Platelet transfusions are only indicated in acute active bleeding uncontrolled by other means or before procedures. In an adult, 1 mega-unit of single donor, leucocyte depleted platelets is usually sufficient to control the bleeding initially. Platelet transfusions have limited benefit in this condition as platelets are rapidly destroyed by the immune system.

REFERRAL

» All cases not responding to steroids and, in the case of HIV patients, not responding to ART – discuss with haematologist.

2.11 THROMBOTIC THROMBOCYTOPENIC PURPURA-HAEMOLYTIC URAEMIC SYNDROME (TTP-HUS)

M31.1/D59.3

DESCRIPTION

Acute syndromes with abnormalities in multiple organ systems with evidence of micro-angiopathic haemolytic anaemia and thrombocytopenia. This condition presents with:

» anaemia,
» thrombocytopenia, often with purpura but not usually severe bleeding,
» acute renal insufficiency that may be associated with anuria and may require acute dialysis,
» neurologic abnormalities, and
» fever.

TTP-HUS is associated with HIV infection and patients should be tested for HIV. TTP-HUS should be distinguished from disseminated intravascular coagulation (DIC) and severe pre-eclampsia where the coagulation profile is deranged.

TREATMENT

In HIV-associated thrombotic thrombocytopenia, start combination antiretroviral therapy urgently.

- Fresh frozen plasma, IV infusion, 30 mL/kg in 3–4 divided doses.

The use of platelet transfusions should be discussed with a specialist.

REFERRAL

» All patients – discuss with a haematologist.

2.12 ACQUIRED COAGULATION DEFECTS

2.12.1 DISSEMINATED INTRAVASCULAR COAGULATION (DIC)

D65

MANAGEMENT

Identify and treat the underlying cause.
If the patient is bleeding, replace haemostatic factors with cryoprecipitate or fresh frozen plasma.
If the patient is not actively bleeding and platelet count > 20 000, then platelet transfusion is not necessary.

Replacement therapy for thrombocytopenia should consist of 1 apheresis single donor unit / megaunit (expected platelet count increment 30–50 x 10^9/L) or 6 random donor units (expected increment 50–60 x 10^9/L), ideally aiming to raise the platelet count > 50 x 10^9/L.
In chronic DIC, or in the absence of bleeding, platelet transfusions should not be given merely to correct the thrombocytopenia.

For hypofibrinogenaemia:

- Cryoprecipitate, 8–10 units.

For depletion of other coagulation factors:

- Fresh frozen plasma, 2–4 units, i.e. 15–20 mL/kg as initial dose
  - Volume: ±280 mL/unit.

Repeat replacement therapy 8 hourly or less frequently, with adjustment according to the clinical picture and laboratory parameters.

Perform frequent estimation of the platelet count and coagulation screening tests.

2.13 VENOUS THROMBO-EMBOLISM

I82

DESCRIPTION

Venous thrombosis should be seen as a spectrum from calf deep venous thrombosis to pulmonary thrombo-embolism. All patients should be seen as high risk.

Differential diagnosis include:

» cellulitis,
» superficial thrombophlebitis,
» chronic venous insufficiency,
» lymphoedema,
» popliteal (Baker's) cyst,
» internal derangement of the knee, and
» calf muscle pull or tear

Diagnosis is primarily clinical and confirmed with imaging studies, e.g. Doppler.

GENERAL MEASURES

Acute management

In pulmonary embolism, cardiovascular resuscitation may be necessary and surgery may be undertaken for intractable disease.

Note:

Superficial thrombosis does not require anticoagulation.
Distal venous thrombosis in the lower limbs, i.e. involving tibial veins only, need not be treated with anticoagulants. Monitor patients with repeat ultrasound if anticoagulants are not used. Ultrasonography should be repeated after a week but may be omitted if D-dimer is negative**.**

Prophylaxis

Advice on prophylaxis should be emphasised.
Eliminate all predisposing factors.
Prevent deep vein thrombosis.

MEDICINE TREATMENT

Acute treatment

Unfractionated heparin initially, plus simultaneous warfarin. After 4–6 days, heparin is usually stopped and oral warfarin continued when a therapeutic INR level is reached.

Note:

Heparin and warfarin therapy should overlap for at least 5 days.

For proximal venous thrombosis and/or pulmonary embolism:

- Unfractionated heparin, SC, 333 units/kg as an initial dose.
  - Follow 12 hours later by 250 units/kg/dose 12 hourly.

Units of unfractionated heparin			Volume of heparin in mL (25 000 units/mL)	
Weight (kg)	Loading dose (units)	12 hourly dose (units)	Loading dose (mL)	12 hourly dose (mL)
35 kg	11 000 units	8 750 units	0.44 mL	0.35 mL
40 kg	13 000 units	10 000 units	0.52 mL	0.4 mL
45 kg	15 000 units	11 250 units	0.6 mL	0.45 mL
50 kg	17 000 units	12 500 units	0.67 mL	0.5 mL
55 kg	18 000 units	13 750 units	0.73 mL	0.55 mL
60 kg	20 000 units	15 000 units	0.8 mL	0.6 mL
65 kg	22 000 units	16 250 units	0.87 mL	0.65 mL
70 kg	23 000 units	17 500 units	0.93 mL	0.7 mL
75 kg	25 000 units	18 750 units	1 mL	0.75 mL
80 kg	27 000 units	20 000 units	1.07 mL	0.8 mL
85 kg	28 000 units	21 250 units	1.13 mL	0.85 mL
90 kg	30 000 units	22 500 units	1.2 mL	0.9 mL

Evidence indicates that PTT monitoring is not necessary with weight based dosing. However in morbid obesity and renal failure (eGFR < 30 mL/minute) unfractionated heparin should be used with PTT monitoring to maintain the PTT at 1.5 to 2.5 times the control.
PTT should be taken 4 hours after SC dose.

OR

- Low molecular weight heparin, e.g. enoxaparin, SC, 1 mg/kg 12 hourly.

Do not use LMWH in morbid obesity and renal failure (eGFR <30 mL/minute).

Follow with:
- Warfarin, oral, 5 mg daily.
  - Adjust dose to keep INR within therapeutic range.
  - Continue warfarin for 3 months if there was a transient precipitating cause.
  - Continue life-long if there is a non-transient precipitating cause or if repeated episodes.
  - Contraindications for warfarin: first trimester and the last month of pregnancy. In these instances, replace with heparin.

Most patients can be managed successfully with therapeutic anticoagulation.

Thrombolytic therapy is indicated only in patients with angiographically confirmed early pulmonary embolism where haemodynamic stability cannot be achieved. Discuss with a specialist.

Prophylaxis
Prophylaxis is indicated for most medical and surgical patients.
- Low molecular weight heparin, e.g.:
- Dalteparin, SC, 5 000 units daily.

OR
- Unfractionated heparin, SC, 5 000 units 12 hourly.

Although the risk of bleeding is small, in the following patients prophylaxis should only be used under exceptional circumstances:
» active bleeding,
» intraocular, intracranial or spinal surgery,
» lumbar puncture or epidural anaesthesia within 12 hours,
» renal insufficiency,
» coagulopathy, or
» uncontrolled hypertension.

Heparin induced thrombocytopenia
A severe immune-mediated drug reaction occurring in 1–5% of patients receiving heparin (unfractionated or low molecular weight heparin) therapy. It presents with thrombocytopenia and thrombosis. Diagnosis needs a high index of suspicion and should be considered if a patient has a 50% drop in platelet count within 5–10 days after initiating heparin therapy. Confirmation is done by positive antibody testing.
Stop heparin and refer all patients.

REFERRAL/CONSULTATION
» Heparin-induced thrombocytopenia.

CHAPTER 3

CARDIOVASCULAR SYSTEM

3.1 ISCHAEMIC HEART DISEASE AND ATHEROSCLEROSIS, PREVENTION

I20-I25

Major risk factors for ischaemic cardio- and cerebrovascular disease:

» Diabetes mellitus.
» Hypertension.
» Central obesity: waist circumference ≥ 102 cm (men) and ≥ 88 cm (women).
» Smoking.
» Dyslipidaemia:
  > total cholesterol > 5.0 mmol/L, or
  > LDL > 3 mmol/L, or
  > HDL < 1 mmol/L in men and < 1.2 mmol/L in women.
» Family history of premature cardiovascular disease in male relatives < 55 years and in female relatives < 65 years.
» Age: men > 55 years, women > 65 years.

GENERAL MEASURES

Lifestyle modification

All persons with risk factors for ischaemic heart disease should be encouraged to make the following lifestyle changes as appropriate:

» Smoking cessation.
» Weight reduction in the overweight patients, i.e. BMI > 25 kg/m^2.
» Maintain ideal weight, i.e. BMI < 25 kg/m^2.
» Reduce alcohol intake to no more than 2 standard drinks/day
» Follow a prudent eating plan i.e. low saturated fat, high fibre and unrefined carbohydrates, with adequate fresh fruit and vegetables.
» Moderate aerobic exercise, e.g. 30 minutes brisk walking at least 3 times a week.

Calculation of risk of developing cardiovascular disease over 10 years (in the absence of cardiovascular disease)

To derive the absolute risk as percentage of patients who will have a myocardial infarction over 10 years, add the points for each risk category (Section A). The risk associated with the total points is then derived from Section B.

SECTION A

Age (years)	**MEN**	**WOMEN**
30–34	0	0
35–39	2	2
40–44	5	4
45–49	6	5
50–54	8	7
55–59	10	8
60–64	11	9
65–69	12	10
70–74	14	11
75–79	15	12

Total cholesterol (mmol/L)	**MEN**	**WOMEN**
< 4.1	0	0
4.1–5.1	1	1
5–6.2	2	3
6.2–7.2	3	4
> 7.2	4	5

HDL cholesterol (mmol/L)	**MEN**	**WOMEN**
> 1.6	–2	–2
1.3–1.5	1	–1
1.2–1.3	0	0
0.9–1.1	1	1
< 0.9	2	2

	MEN	**WOMEN**
Smoker	4	3
Diabetic*	3	4

*Type 2 diabetics >40 years, qualify for statin therapy irrespective of risk score.

	MEN		WOMEN	
Systolic BP (mmHg)	Untreated	Treated	Untreated	Treated
< 120	–2	0	–3	–1
120–129	0	2	0	2
130–139	1	3	1	3
140–149	2	4	2	5
150–159	2	4	4	6
≥ 160	3	5	5	7

SECTION B

Total points

10-year risk %	MEN	10-year risk %	WOMEN
<1	≤ –3	<1	≤ –2
1.1	–2	1.0	–1
1.4	–1	1.2	0
1.6	0	1.5	1
1.9	1	1.7	2
2.3	2	2.0	3
2.8	3	2.4	4
3.3	4	2.8	5
3.9	5	3.3	6
4.7	6	3.9	7
5.6	7	4.5	8
6.7	8	5.3	9
7.9	9	6.3	10
9.4	10	7.3	11
11.2	11	8.6	12
13.2	12	10.0	13
15.6	13	11.7	14
18.4	14	13.7	15
21.6	15	15.9	16
25.3	16	18.5	17
29.4	17	21.5	18
>30	≥18	24.8	19
		28.5	20
		>30	21+

MEDICINE TREATMENT

Indication for lipid lowering drug therapy

» Established atherosclerotic disease, irrespective of cholesterol or triglyceride plasma concentrations:
  > ischaemic heart disease,
  > peripheral vascular disease, or
  > atherothrombotic stroke.
» Type 2 diabetics > 40 years of age.
» Chronic kidney disease (eGFR < 60 mL/minute.)
» A risk of MI of greater than 20% in 10 years (see table above).

Such high-risk patients will benefit from lipid lowering (statin) therapy irrespective of their baseline LDL-C levels.

▪ HMGCoA reductase inhibitors (statins) that lower LDL by at least 25%, e.g.:
• Simvastatin, oral, 10 mg at night.

Note:
When lipid-lowering drugs are used, this is always in conjunction with ongoing lifestyle modification

REFERRAL

» Random cholesterol >7.5 mmol/L.
» Fasting (14 hours) triglycerides >10 mmol/L.

3.2 ACUTE CORONARY SYNDROMES

These conditions should be managed in a high care setting with continuous ECG and frequent blood pressure monitoring.

3.2.1 ST ELEVATION MYOCARDIAL INFARCTION (STEMI)

I21

DESCRIPTION

Ischaemic chest pain that is ongoing beyond 30 minutes and associated with persistent ST elevation or new left bundle branch block (LBBB). (Repeat ECG regularly as clinically indicated).

MEDICINE TREATMENT

If clinically hypoxic:
• Oxygen.

- Aspirin, oral, 300 mg immediately as a single dose (chewed or dissolved).
  - Followed with 75–150 mg daily with food.

PLUS

Thrombolytic therapy:

- Streptokinase, IV 1.5 million units diluted in 100 mL sodium chloride 0.9%, infused over 30–60 minutes. **Do not use heparin if streptokinase is given**.

Indications	Contra-indications
» For acute myocardial infarction with ST elevation: > if history of onset is less than 6 hours. (Beyond 6 hours treat as NSTEMI (see below), > if on-going ischaemic pain, or > for new left bundle branch block.	» Absolute: > streptokinase used within the last year, > previous allergy, > CVA within the last 3 months, > history of recent major trauma, > bleeding within the last month, > aneurysms, > brain or spinal surgery or head injury within the preceding month, or > active bleeding or known bleeding disorder. » Relative: > refractory hypertension, > warfarin therapy, > recent retinal laser treatment, > subclavian central venous catheter, > pregnancy, > TIA in the preceding 6 months, > traumatic resuscitation.

Adjunctive treatment

For pain:

- Morphine, IV, 1–2 mg/minute.
  - Dilute 10 mg up to 10 mL with sodium chloride 0.9%.
  - Total maximum dose: 10 mg.
  - Repeat after 4 hours if necessary.

Pain not responsive to this dose may suggest ongoing unresolved ischaemia.

Nitrates, e.g.:

- Isosorbide dinitrate, SL, 5 mg immediately as a single dose.
  - May be repeated at 5-minute intervals for 3 or 4 doses.

For ongoing chest pain, control of hypertension or pulmonary oedema:

- Glyceryl trinitrate, IV, 5–200 mcg/minute, titrated to response.
  - Start with 5 mcg/minute and increase by 5 mcg/minute every 5 minutes until response or until the rate is 20 mcg/minute.
  - If no response after 20 mcg/minute increase by 20 mcg/minute every 5 minutes until pain response or drug no longer tolerated.
  - Flush the PVC tube before administering to patient.
  - Monitor blood pressure carefully.

Volume of diluent	Glyceryl trinitrate 5mg/mL	Concentration of dilution
250 mL	5 mL (25 mg)	100 mcg/mL
	10 mL (50 mg)	200 mcg/mL
	20 mL (100 mg)	400 mcg/mL
500 mL	10 mL (50 mg)	100 mcg/mL
	20 mL (100 mg)	200 mcg/mL
	40 mL (200 mg)	400 mcg/mL

Solution Concentration (mcg/mL)	100 mcg/mL solution	200 mcg/mL solution	400 mcg/mL solution
Dose (mcg/min)	Flow rate (microdrops/min = mL/hour)		
5	3	—	—
10	6	3	—
15	9	—	—
20	12	6	3
30	18	9	—
40	24	12	6
60	36	18	9
80	48	24	12
100	60	30	15
120	72	36	18
160	96	48	24
200	–	60	30

When clinically stable without signs of heart failure, hypotension, bradydysrhythmias or asthma:

- β-blocker, e.g.:
- Atenolol, oral, 50 mg daily.

HMGCoA reductase inhibitors (statins) that lower LDL by at least 25%, e.g.:

- Simvastatin, oral, 10 mg daily.

For anterior myocardial infarction, pulmonary congestion or ejection fraction < 40%:

- ACE inhibitor, e.g.:
- Enalapril, oral 10 mg 12 hourly.

REFERRAL

» Refractory cardiogenic shock.
» Refractory pulmonary oedema.
» Haemodynamically compromising ventricular dysrhythmia.
» Myocardial infarction-related mitral regurgitation or ventricular septal defect (VSD).
» Contraindication to thrombolytic therapy (only if within the period for stenting).
» Ongoing ischaemic chest pain.
» Failed reperfusion (<50% reduction in ST elevation at 90 minutes in leads showing greatest ST elevation, especially in anterior infarct or inferior infarct with right ventricular involvement).

3.2.2 NON-ST ELEVATION MYOCARDIAL INFARCTION (NSTEMI) AND UNSTABLE ANGINA (UA)

I21/I20.0

DESCRIPTION

Non-ST elevation MI: Chest pain that is increasing in frequency and/or severity, or occurring at rest. The chest pain is associated with elevated cardiac enzymes and ST segment depression or T wave inversion on ECG.

Unstable angina pectoris: Chest pain that is increasing in frequency and or severity, or occurring at rest. It also encompasses post-infarct angina. The chest pain may be associated with ST segment depression or T wave inversion on ECG. There is no rise in cardiac enzymes.

MEDICINE TREATMENT

If clinically hypoxic:

- Oxygen.

- Aspirin, oral, 300 mg immediately as a single dose (chewed or dissolved).
  - Followed with 75–150 mg daily.

PLUS

Anticoagulation:

For acute myocardial infarction <u>with no ST elevation</u>:

- Unfractionated heparin, IV bolus, 5 000 units.
  - Follow with 1 000–1 200 units hourly monitored by aPTT.
  - Continue infusion for 3–5 days.

OR

- Low molecular weight heparin, e.g.:
- Enoxaparin, SC, 1 mg/kg 12 hourly for two days.

Note:
Thrombolysis is not indicated except if new left bundle branch block (LBBB). See section 3.2.1: ST elevation myocardial infarction (STEMI).

To relieve spasm and pain and to reduce preload:

- Isosorbide dinitrate SL, 5 mg immediately as a single dose.
  - May be repeated at 5-minute intervals for 3 or 4 doses.

For persistent pain and if oral therapy is insufficient:

- Glyceryl trinitrate, IV, 5–200 mcg/minute, titrated to response.
  - Start with 5 mcg/minute and increase by 5 mcg/minute every 5 minutes until response or until the rate is 20 mcg/minute.
  - If no response after 20 mcg/minute increase by 20 mcg/minute every 5 minutes until pain response or drug no longer tolerated.
  - Flush the PVC tube before administering to patient.
  - Monitor blood pressure carefully.

Volume of diluent	Glyceryl trinitrate 5mg/mL	Concentration of dilution
250 mL	5 mL (25 mg)	100 mcg/mL
	10 mL (50 mg)	200 mcg/mL
	20 mL (100 mg)	400 mcg/mL
500 mL	10 mL (50 mg)	100 mcg/mL
	20 mL (100 mg)	200 mcg/mL
	40 mL (200 mg)	400 mcg/mL

Solution Concentration (mcg/mL)	100 mcg/mL solution	200 mcg/mL solution	400 mcg/mL solution
Dose (mcg/min)	Flow rate (microdrops/min = mL/hour)		
5	3	—	—
10	6	3	—
15	9	—	—
20	12	6	3
30	18	9	—
40	24	12	6
60	36	18	9
80	48	24	12
100	60	30	15
120	72	36	18
160	96	48	24
200	–	60	30

To relieve pain:
- Morphine, IV, 1–2 mg/minute.
  - Dilute 10 mg up to 10 mL with sodium chloride 0.9%.
  - Total maximum dose: 10 mg.
  - Repeat after 4 hours if necessary.
  - Pain not responsive to this dose may suggest ongoing unresolved ischaemia.

If there is cardiac failure or LV dysfunction:
- ACE inhibitor, e.g.:
- Enalapril, oral, 10 mg 12 hourly.

3.2.3 CHRONIC MANAGEMENT OF STEMI / NSTEMI / UA

GENERAL MEASURES
» Lifestyle modification.
See section 3.1: Ischaemic heart disease and atherosclerosis, prevention.

MEDICINE TREATMENT
Continue oral therapy as above.

If heart failure develops, replace atenolol with:
- Carvedilol, oral.
See section 3.4: Congestive Cardiac Failure.

REFERRAL
» Ongoing chest pain or post-infarct angina.

3.2.4 ANGINA PECTORIS, STABLE
I20

DESCRIPTION
Characteristic chest pain due to myocardial ischaemia usually occurring on exercise and relieved by rest.

GENERAL MEASURES
» Lifestyle modification.
See section 3.1: Ischaemic heart disease and atherosclerosis, prevention.

MEDICINE TREATMENT
Long-term prophylaxis for thrombosis:
- Aspirin, oral, 75–150 mg daily with food.

PLUS

Relief of angina:
- Nitrates, short acting e.g.:
- Isosorbide dinitrate, SL, 5 mg.
  - May be repeated if required at 5-minute intervals for 3 or 4 doses.

PLUS

Step 1
- Atenolol, oral, 50–100 mg daily.
  - Titrate to resting heart rate of approximately 60 beats/minute.

If ß-blocker cannot be tolerated or is contraindicated, consider long acting calcium channel blocker.

Step 2

ADD
- Long acting calcium channel blocker e.g.:
- Amlodipine, oral, 5 mg.

Step 3

ADD
- Isosorbide mononitrate, oral, 10–20 mg.
  - To provide a nitrate-free period to prevent tolerance, take at 8:00 and 14:00.
  - Modify for night shift workers.

OR
- Isosorbide dinitrate, oral, 20–40 mg.
  - To provide a nitrate-free period to prevent tolerance, take at 8:00 and 14:00.
  - Modify for night shift workers.

- HMGCoA reductase inhibitors, e.g.:
- Simvastatin, oral, 10 mg daily.
  Therapy should be initiated together with appropriate lifestyle modification. See section 3.1: Ischaemic heart disease and atherosclerosis, prevention.

REFERRAL
» When diagnosis is in doubt.
» Failed medical therapy.

3.2.5 ATHEROSCLEROTIC PERIPHERAL ARTERIAL DISEASE

I25.0

DESCRIPTION
History and palpation of pulses confirms diagnosis.

GENERAL MEASURES
Smoking cessation is essential and is the single most important intervention to prevent progression.
Exercise within exercise tolerance and other lifestyle modifications.
See section 3.1: Ischaemic heart disease and atherosclerosis, prevention.

MEDICINE TREATMENT
Long-term prophylaxis for thrombosis:
- Aspirin, oral, 75–150 mg daily with food.

- HMGCoA reductase inhibitors, e.g.:
- Simvastatin, oral, 10 mg daily.
  Therapy should be initiated together with appropriate lifestyle modification.
  See section 3.1: Ischaemic heart disease and atherosclerosis, prevention.

REFERRAL
» Ongoing vascular insufficiency, which may be surgically reversible.

3.3 CARDIAC DYSRHYTHMIAS

Exclude underlying structural cardiac disease in all patients with cardiac dysrhythmias.

3.3.1 NARROW QRS COMPLEX (SUPRAVENTRICULAR) TACHYDYSRHYTHMIAS
I47.1

DESCRIPTION
Sustained (> 30 seconds) or non-sustained narrow QRS (≤ 0.1 seconds) tachycardias.

REFERRAL
Narrow QRS complex (supraventricular) tachydysrhythmias
» Poor rate control.
» Severe symptoms.

Regular narrow QRS (supraventricular) tachycardias
» Frequent or severe symptoms for curative radiofrequency catheter ablation.
» All Wolf-Parkinson-White (WPW) syndrome (sinus rhythm ECG shows delta waves) for radiofrequency catheter ablation.

3.3.1.1 ATRIAL FIBRILLATION

I48

Acute onset (<48 hours)

Assess clinically, e.g. heart failure, mitral stenosis, thyrotoxicosis, hypertension, age and other medical conditions.
Consider anticoagulation with heparin or warfarin.
Synchronised direct current (DC) cardioversion is occasionally necessary in emergency. Consider if first episode.

Non-acute/chronic (> 48 hours)

As above, but not immediate DC cardioversion, unless emergency.

MEDICINE TREATMENT

Patients with rheumatic heart disease require anticoagulation with warfarin.
Patients under the age of 65 with no heart diseases or other risk factors may be managed with aspirin alone.

Risk factors of stroke in atrial fibrillation are:

» cardiac failure,
» hypertension,
» age > 65,
» diabetes, and
» stroke.

If patient has one of those risk factors use either aspirin or warfarin. Where more than one risk factor is present, use warfarin

Initial therapy

Anticoagulate with warfarin:

- Warfarin, oral, 5 mg daily adjusted according to INR.

- Atenolol, oral, 50–100 mg daily.
  - Contraindicated in asthmatics, heart failure.

OR

In CCF:

- Carvedilol, oral.
  See section 3.4: Congestive cardiac failure.

PLUS

If control not adequate add:

- Digoxin, oral 0.25 mg daily according to response.
  - Higher doses require digoxin trough level monitoring.

If β-blockers are contra-indicated, e.g. asthma or severe peripheral vascular disease:

- Verapamil, oral, 80 mg 12 hourly.

If not controlled on those agents, refer to specialist for consideration of alternative therapy, e.g. amiodarone.

DC cardioversion in selected cases, after 4 weeks warfarin anticoagulation.

Long-term therapy

Continue warfarin anticoagulation long-term, unless contra-indicated:

- Warfarin, oral, 5 mg daily.
  Control with INR to therapeutic range:
  - INR between 2–3 — patient is stable; do 3 monthly monitoring
  - INR < 1.5 or > 3.5 — do monthly monitoring

Caution
Use warfarin only if INR can be monitored regularly.

For rate control:

- Atenolol, oral, 50–100 mg daily.
  - Contraindicated in asthmatics, heart failure.

In CCF:

- Carvedilol, oral.
  See section 3.4: Congestive cardiac failure.

PLUS

If control not adequate add:

- Digoxin, oral 0.25 mg daily according to response.
  - In patients with impaired renal function (eGFR<60 mL/minute), consider 0.125 mg daily and adjust according to trough level monitoring.
  - In all patients, digoxin trough level monitoring is required at all doses.

If β-blockers are contra-indicated, e.g. asthma or severe peripheral vascular disease:

- Verapamil, oral, 80 mg 12 hourly.

If not controlled on these agents, refer to specialist for consideration of alternative.

Prevention of recurrent paroxysmal atrial fibrillation
Only in patients with severe symptoms despite the above measures:

- Amiodarone, oral, 200 mg 8 hourly for 1 week. Specialist initiated.
  - Followed by 200 mg 12 hourly for one week
  - Thereafter 200 mg daily.

  Precautions:
  - Halve dosage of warfarin and monitor INR closely, until stable.
  - Avoid concomitant digoxin.
  - Monitor thyroid function every 6 months as thyroid abnormalities may develop.
  - Ophthalmological examination every 6 months.

3.3.1.2 ATRIAL FLUTTER

I48

Atrial rate >250 beats/minute with no flat baseline.
Can be difficult to recognize if 2:1 atrioventricular (AV) block, as the first of the 2 p waves preceding each QRS complex might be confused with the t-wave of the preceding beat. Vagal stimulation might slow the ventricular rate and make the dysrhythmia more obvious.

GENERAL MEASURES

Synchronised DC cardioversion, 200 J, after sedation with:

- Diazepam, IV, 10–20 mg.

If flutter has been present longer than 48 hours, defer cardioversion until after 4 weeks' anticoagulation with warfarin, unless severe symptoms or heart failure require urgent cardioversion.

MEDICINE TREATMENT

DC cardioversion is the most effective therapy.
Do not use verapamil as it will not convert flutter to sinus rhythm and may cause serious hypotension.

Anticoagulants if sustained.

Long-term therapy
Recurrent atrial flutter is an indication for referral as some may be cured by radio-frequency catheter ablation.

3.3.1.3 AV JUNCTIONAL RE-ENTRY TACHYCARDIAS

I47.1

Usually paroxysmal.
Often young patients with normal hearts.
AV nodal re-entry or WPW syndrome.
P waves usually not visible (hidden by QRS complexes).

GENERAL MEASURES

Vagal manoeuvres: valsalva or carotid sinus massage. The patient should be supine and as relaxed as possible, to avoid competing sympathetic reflexes.

MEDICINE TREATMENT

Initial therapy

If vagal manoeuvres fail:

- Adenosine, rapid IV bolus, 6 mg.
  - Follow by a bolus of 10 mL sodium chloride 0.9% to ensure that it reaches the heart before it is broken down.
  - Half life: ± 10 seconds.

  Run the ECG for 1 minute after the injection.
  - If 6 mg fails, repeat with 12 mg.
  - If this fails, repeat with another 12 mg.

  If the drug reaches the central circulation before it is broken down the patient will experience flushing, sometimes chest pain, wheezing and anxiety.

  If the tachycardia fails to terminate without the patient experiencing those symptoms, the drug did not reach the heart.

If none of the above is effective, or if the patient is hypotensive, consider DC shock.

Long term therapy

Teach the patient to perform vagal manoeuvres. Valsalva is the most effective.

For infrequent, non-incapacitating symptoms:

- ß–blocker, e.g.:
- Atenolol, oral, 50–100 mg daily.

If asthmatic, but normal heart:

- Verapamil, oral, 80–120 mg 8 hourly.

Verapamil and digoxin are contraindicated in WPW syndrome.

3.3.2 WIDE QRS (VENTRICULAR) TACHYARRHYTHMIAS

I47.1/I47.2

DESCRIPTION

Sustained (>30 seconds) or non-sustained wide QRS (>0.12 seconds) tachycardias

3.3.2.1 REGULAR WIDE QRS TACHYCARDIAS

Regular wide QRS tachycardias are **ventricular** until proved otherwise.
Regular wide QRS supraventricular tachycardias are uncommon.

Refer all cases after resuscitation and stabilisation.
Emergency DC cardioversion is mandatory with a full protocol of Cardio-pulmonary resuscitation (CPR).

GENERAL MEASURES

CPR.

If no cardiac arrest:
DC cardioversion, 200 J, after sedation with:

- Diazepam, IV, 10–20 mg.
  - If 200 J fails, use 360 J.

If cardiac arrest:
Defibrillate (not synchronised).

MEDICINE TREATMENT

Caution
Never give verapamil IV to patients with a wide QRS tachycardia.

DC cardioversion is first line therapy for regular wide QRS tachycardias. Drugs are needed if ventricular tachycardia (VT) recurs after cardioversion, or spontaneous termination.

- Amiodarone, IV, 5 mg/kg infused over 30 minutes.

Follow with:

- Amiodarone, oral, 800 mg daily for 7 days.
  - Then 600 mg daily for 3 days.
  - Titrate to maintenance dose of 200–400 mg daily.

Precautions:
- o If on warfarin, halve the dose of warfarin and monitor INR closely, until INR is stable.
- o Avoid concomitant digoxin.
- o Monitor thyroid function every 6 months as thyroid abnormalities may develop.
- o Ophthalmological examination every 6 months.

OR
Only in haemodynamically stable patients:
- Lidocaine (lignocaine), IV, 50–100 mg (1–2 mg/kg) initially and at 5 minute intervals if required to a total of 200–300 mg.

Thereafter, for recurrent ventricular tachycardia only:
- Lidocaine, IV infusion, 1–3 mg/minute for 24–30 hours.

Lidocaine will only terminate ± 30% of sustained ventricular tachycardias, and may cause hypotension, heart block or convulsions.
For emergency treatment of ventricular tachycardia, DC cardioversion is first-line therapy, even if stable.

3.3.2.2 SUSTAINED (>30 SECONDS) IRREGULAR WIDE QRS TACHYCARDIAS

These tachycardias are usually due to atrial fibrillation with bundle branch block, or pre-excitation (WPW syndrome).

If the QRS complexes have a pattern of typical right or left bundle branch block, with a rate < 170 beats per minute, treat as for atrial fibrillation. See section 3.3.1: Narrow QRS complex (supraventricular) tachydysrhythmias.

If the rate is >170 beats per minute, and/or the complexes are atypical or variable, the likely diagnosis is WPW syndrome with atrial fibrillation, conducting via the bypass tract. Treat with DC conversion.

Do not treat with drugs.
Verapamil and digoxin may precipitate ventricular fibrillation by increasing the ventricular rate.

3.3.2.3 NON-SUSTAINED (< 30 SECONDS) IRREGULAR WIDE QRS TACHYCARDIAS

These tachycardias are usually ventricular. They are common in acute myocardial infarction.

In acute myocardial infarction, treat non-sustained ventricular tachycardia only if it causes significant haemodynamic compromise.
Ensure the serum potassium level >4 mmol/L.

MEDICINE TREATMENT

- Amiodarone, IV, 5 mg/kg infused over 30 minutes. Specialist initiated.

Follow with:

- Amiodarone, oral, 800 mg daily for 7 days.
  - Then 600 mg daily for 3 days.
  - Follow with a maintenance dose of 200–400 mg daily, depending upon clinical judgement.

  Precautions:
  - If on warfarin, halve the dose of warfarin and monitor INR closely, until INR is stable.
  - Avoid concomitant digoxin.
  - Monitor thyroid function every 6months as thyroid abnormalities may develop.
  - Ophthalmological examination every 6 months.

OR

Only in haemodynamically stable patients:

- Lidocaine (lignocaine), IV, 50–100 mg (1–2 mg/kg) initially and at 5 minute intervals if required to a total of 200–300 mg.

Thereafter, for recurrent ventricular tachycardia only:

- Lidocaine, IV infusion, 1–3 mg/minute for 24–30 hours.

Lidocaine will only terminate ± 30% of sustained ventricular tachycardias, and may cause hypotension, heart block or convulsions.
For emergency treatment of ventricular tachycardia, DC cardioversion is first-line therapy, even if stable.

In the absence of acute ischaemia or infarction, consider torsades de pointes, due to QT prolonging drugs.

3.3.2.4 TORSADES DE POINTES VENTRICULAR TACHYCARDIA (VT)

Torsades de pointes Ventricular Tachycardia (VT) has a twisting pattern to the QRS complexes and a prolonged QT interval in sinus rhythm. It is usually due to a QT-prolonging drug, and/or hypokalaemia and/or a history of alcohol abuse/malnutrition.

GENERAL MEASURES

Cardioversion/defibrillation, as necessary.
Torsades complicating bradycardia: temporary pacing.

MEDICINE TREATMENT

Stop all QT-prolonging drugs.
Correct serum potassium.

- Magnesium sulphate, IV, 2 g administered over 5–10 minutes.

If recurrent episodes after initial dose of magnesium sulphate:

- Magnesium sulphate, IV, 2 g administered over 24 hours.

Torsades complicating bradycardia:

- Adrenaline infusion to raise heart rate to > 100/ minute (if temporary pacing unavailable).

REFERRAL

» All cases of wide QRS tachycardia, after resuscitation and stabilization.

3.3.3 HEART BLOCK (SECOND OR THIRD DEGREE)

I44.1/I44.2

DESCRIPTION

The majority of cases occur in patients over 60 years old and are idiopathic, with an excellent long-term prognosis, provided a permanent pacemaker is implanted. Acute, reversible AV block commonly complicates inferior myocardial infarction. The condition may also be induced by metabolic and electrolyte disturbances, as well as by certain medicines.

GENERAL MEASURES

Emergency cardio-pulmonary resuscitation.
External pacemaker should be available in all secondary hospitals and must be preceded by appropriate analgesia.

MEDICINE TREATMENT

Analgesia if external pacemaker:

- Morphine, IM, 10–15 mg 3–6 hourly.

AV nodal block with narrow QRS complex escape rhythm only:

- Atropine, IV bolus, 0.6–1.2 mg.
  - o May be repeated as needed until a pacemaker is inserted.
  - o Use in patients with inferior myocardial infarct and hypotension and second degree AV block, if symptomatic.
  - o It is temporary treatment of complete AV block before referral (urgently) for pacemaker.

OR

For resuscitation of asystole in combination with CPR:

- Adrenaline (epinephrine) 1:10 000, slow IV, 5 mL (0.5 mg).
  - o Used as temporary treatment of complete heart block when other drugs are not effective.

REFERRAL

» All cases with a heart rate < 40 beats/minute after resuscitation and stabilization.
» All cases of second or third degree AV block, whether or not myocardial infarct or other reversible cause is suspected, and whether or not the patient is thought to be symptomatic.

A permanent pacemaker is the definitive form of treatment. These are only available in tertiary institutions.

3.3.4 SINUS BRADYCARDIA

I49.8

DESCRIPTION

This rhythm does not require treatment, unless it is causing symptoms, i.e. syncope, dizziness, tiredness and poor effort tolerance.

Sinus bradycardia <50 beats/minute or sinus arrest with slow escape rhythm, accompanied by hypotension, strongly suggest a treatable underlying cause such as:

» acute inferior myocardial infarct,
» hyperkalaemia, especially if wide QRS and/or peaked T waves,
» drugs, especially combination of verapamil and ß-blocker or digoxin,
» hypothermia,
» hypoxia, or
» hypothyroidism.

Treat the cause. Consider atropine if inferior infarct.

3.3.5 SINUS ARREST

I45.5

Refer all urgently to a cardiologist.

3.4 CONGESTIVE CARDIAC FAILURE (CCF)

I50.0

DESCRIPTION

CCF is a clinical syndrome and has several causes. The cause and immediate precipitating factor(s) of the CCF must be identified and treated to prevent further damage to the heart.

Potentially reversible causes include:

» anaemia,
» thyroid disease,
» valvular heart disease,
» constrictive pericarditis.
» thiamine deficiency,
» ischaemic heart disease,
» haemochromatosis, and

GENERAL MEASURES

Patient and family education.
Monitor body weight to assess changes in fluid balance.
Limit fluid intake to 1–1.5 L/day if fluid overloaded despite diuretic therapy.
Salt restriction.
Regular exercise within limits of symptoms.
Avoid NSAIDs as these may exacerbate fluid retention.
Counsel regarding the risk of pregnancy and the use of oral contraceptives.

MEDICINE TREATMENT

Mortality is significantly reduced by the use of ACE inhibitors, ß-blockers and spironolactone in heart failure.
Digoxin has been shown to reduce hospitalisation only.

Diuretic

Mild volume overload (mild CCF) and normal renal function, thiazide diuretic:

- Hydrochlorothiazide, oral, 25–50 mg daily.
  - Caution in patients with gout.
  - Contraindicated in impaired renal function.

Significant volume overload or abnormal renal or hepatic function, loop diuretic:

- Furosemide, oral, daily.
  - Initial dose: 40 mg/day.
  - Higher dosages may be needed, especially if also renal failure.

Note:

Unless patient is clinically fluid overloaded, reduce the dose of diuretics before adding an ACE inhibitor.
After introduction of an ACE inhibitor, try to reduce diuretic dose and consider a change to hydrochlorothiazide.
Routine use of potassium supplements with diuretics is not recommended. They should be used short term only, to correct documented low serum potassium level.

ACE inhibitor, e.g.:

- Enalapril, oral, 2.5 mg 12 hourly up to 10 mg 12 hourly.

If ACE inhibitor intolerant, i.e. intractable cough:

- Angiotensin receptor blocker (ARB), e.g.:
- Losartan, oral, 50–100 mg daily. (Specialist initiated)

Spironolactone

Use with an ACE inhibitor in patients presenting with Class III or IV heart failure.
Do not use if GFR <30 mL/minute.

Monitoring of potassium levels is essential if spironolactone is used with an ACE inhibitor or other potassium sparing agent or in the elderly.

- Spironolactone, oral, 25 mg once daily.

ß-blockers

For all stable patients with heart failure who tolerate it.
Patients should not be fluid overloaded or have low blood pressure before initiation of therapy.

- Carvedilol, oral.
  - Initial dose: 3.125 mg daily.
  - Increase after two weeks to 3.125 g 12 hourly, if tolerated.
  - Increase at two-weekly intervals by doubling the daily dose until a maximum of 25 mg 12 hourly, if tolerated.
  - If not tolerated, i.e. worsening of cardiac failure symptoms, reduce the dose to the previously tolerated dose.
  - Up-titration can take several months.

Digoxin

Symptomatic CCF owing to systolic dysfunction.

- Digoxin, oral, 0.125 mg daily. Specialist initiated.
  - Digoxin trough blood levels (before the morning dose) should be maintained between 0.65 and 1.5 nmol/L
  - Patients at high risk of digoxin toxicity are:
    - » the elderly,
    - » patients with poor renal function,
    - » hypokalaemia, and
    - » patients with low body weight.

Anticoagulants

Heparin for DVT prophylaxis.
For patients admitted to hospital, unless contraindicated:

- Unfractionated heparin, SC, 5 000 units 8 hourly.

Warfarin: See section 3.3.1: Narrow QRS complex (supraventricular) tachydysrhythmias.

- Warfarin, oral, 5 mg daily.
  - Control with INR to therapeutic range, i.e. between 2.0 and 2.5.

Anti-dysrhythmic drugs

See Section 3.3: Cardiac Dysrhythmias.
Only for potentially life-threatening ventricular dysrythmias.
Always exclude electrolyte abnormalities and drug toxicity first.

Thiamine

Consider in all unexplained heart failure.

- Thiamine, oral/IM, 100 mg daily.

REFERRAL

» Where specialised treatment and diagnostic work-up is needed and to identify treatable and reversible causes.

3.5 ENDOCARDITIS, INFECTIVE

I09.1

GENERAL MEASURES

Bed rest.

Early surgical intervention in acute fulminant and prosthetic valve endocarditis is often indicated.

MEDICINE TREATMENT

Treat accompanying complications, e.g. cardiac failure.

Antibiotic therapy

It is essential to do at least three and no more than six blood cultures taken by separate venipunctures before starting antibiotics.

In patients with subacute presentation and no haemodynamic compromise, wait for the results before starting antibiotics.

Empiric treatment is indicated in patients with a rapidly fulminant course or with severe disease only.

Aminoglycoside therapy should be monitored with trough levels for safety.

Duration of therapy given is the minimum and may be extended based on the response (clinical and laboratory).

In **penicillin-allergic patients** vancomycin is the antibiotic of choice.

Empiric therapy

Native valve	• Benzylpenicillin (penicillin G), IV, 5 million units 6 hourly for 4 weeks **PLUS** • Gentamicin, IV, 1.5 mg/kg 12 hourly for 2 weeks If staphylococcal infection is suspected (acute onset): **ADD** • Cloxacillin, IV, 3 g 6 hourly.
Prosthetic valve*	• Vancomycin, IV, 15 mg/kg 12 hourly for 6 weeks. **PLUS** • Rifampicin, oral, 7.5 mg/kg 12 hourly for 6 weeks. **PLUS** • Gentamicin, IV, 1.5 mg/kg 12 hourly for 2 weeks.

* All cases of prosthetic valve endocarditis should be managed in consultation with an appropriate specialist.

Directed therapy (native valve)

Streptococcal	
Fully susceptible to penicillin MIC: < 0.2mg/L	• Benzylpenicillin (penicillin G), IV, 5 million units 6 hourly for 4 weeks.
Moderately susceptible MIC: 0.12–0.5 mg/L	• Benzylpenicillin (penicillin G), IV, 5 million units 6 hourly for 4 weeks. **PLUS** • Gentamicin, IV, 1.5 mg/kg 12 hourly for 2 weeks.
Moderately resistant MIC: 0.5–4mg/L Enterococci and Abiotrophia spp. (nutritionally variant streptococci)	• Benzylpenicillin (penicillin G), IV, 5 million units 6 hourly for 4 weeks. **PLUS** • Gentamicin, IV, 1.5 mg/kg 12 hourly for 4 weeks. Six weeks of therapy may be required in cases with a history of > 3 months, or mitral or prosthetic valve involvement.
Fully resistant MIC: > **4** mg/L	• Vancomycin, IV, 15 mg/kg 12 hourly for 6 weeks. **PLUS** • Gentamicin, IV, 1.5 mg/kg 12 hourly for 6 weeks.
Enterococcal	
Fully susceptible to penicillin MIC: < 4mg/L	• Benzylpenicillin (penicillin G), IV, 5 million units 6 hourly for 4 weeks.
Resistant to penicillin MIC ≥4mg/L **or** significant β-lactam allergy **and** Sensitive to vancomycin MIC: ≤4 mg/L	Consult a specialist.

Staphylococcal (cloxacillin/methicillin sensitive)	
S. aureus	• Cloxacillin, IV, 3 g 6 hourly for 4 weeks. If necessary, add: • Gentamicin, IV, 5 mg/kg daily for the first 3–5 days. The benefit of adding an aminoglycoside has not been established. In the rare occurrence of a penicillin sensitive staphylococcus, penicillin should be used in preference to cloxacillin.
Coagulase-negative staphylococci	Consult expert opinion on correct diagnosis in this setting.
Staphylococcal (cloxacillin/methicillin resistant) or methicillin sensitive with significant beta-lactam allergy	
S. aureus	• Vancomycin, IV, 15 mg/kg 12 hourly for 4 weeks.
Coagulase-negative staphylococci	Consult expert on correct on antibiotic choice.

Directed therapy for prosthetic valve endocarditis
Duration of therapy is usually a minimum of at least 6 weeks.
Seek expert opinion on antibiotic choice.

Endocarditis prophylaxis
Cardiac conditions
Patients with the following cardiac conditions are at risk of developing infective endocarditis:
» Acquired valvular heart disease with stenosis or regurgitation.
» Prosthetic heart valves.
» Structural congenital heart disease, including surgically corrected or palliated structural conditions, but excluding isolated atrial septal defect, fully repaired ventricular septal defect or fully repaired patent ductus arteriosus.
» Previous endocarditis.

Procedures requiring prophylaxis
Antibiotic prophylaxis is recommended for all dental procedures that involve manipulation of either the gingival tissue or the peri-apical region of the teeth.
Antibiotic prophylaxis is not recommended for patients who undergo a gastro-intestinal or genito-urinary procedure.

Prophylaxis
Maintain good dental health.
This is the most important aspect of prophylaxis.
Refer all patients to a dental clinic/dental therapist for assessment and on-going dental care.

- Amoxicillin, oral, 2 g one hour before the procedure.

Penicillin allergy:
- Clindamycin, oral, 600 mg one hour before the procedure.

If patient cannot take oral:
- Ampicillin, IV/IM, 2 g one hour before the procedure.

Penicillin allergy:
- Clindamycin IM/IV, 600 mg 1 one hour before the procedure.

The NICE review noted the lack of a consistent association between interventional procedures and development of infective endocarditis, and that the efficacy of antibiotic prophylaxis is unproven. It further commented that because the antibiotic is not without risk, there is a potential for a greater mortality from severe hypersensitivity than from withholding antibiotics.

REFERRAL
» Complications such as renal failure and progressive cardiac failure.
» For surgical intervention, e.g. emergency valve replacement.
» Assessment for post treatment valve replacement.

3.6 HYPERTENSION
I10

KEY POINTS
Hypertension control has significant benefit for patients.
Detect and treat co-existent risk factors.
Assess cardiovascular risk.
Lifestyle modification and patient education is essential for all patients.

Medicine treatment is needed for SBP >140 mmHg and DBP > 90 mmHg. See medicine treatment choices below.
Immediate medicine treatment is needed for DBP > 110 mmHg and/or SBP >180 mmHg.

Patient evaluation for risk stratification [target organ damage (TOD) and clinical cardiovascular disease (CCD) and co-morbidity]
Thorough focused history and clinical examination is complemented by investigations.

Major risk factors for CVD:
» diabetes mellitus,
» hypertension,
» obesity,
» smoking,
» dyslipidaemia, or
» family history of primary hypertension or premature cardiovascular disease in men <55 years and in women <65 years.

Target organ damage (TOD):
» left ventricular hypertrophy,
» microalbuminuria, or
» elevated creatinine level.

Associated clinical condition (ACC):
» ischaemic heart disease (angina or prior myocardial infarction),
» heart failure,
» stroke or transient ischaemic attack,
» chronic kidney disease,
» retinopathy,
» peripheral arterial disease.

Investigations
If overweight, record body weight and waist circumference at each visit when BP is measured. Central obesity is defined as waist circumference:
» 102 cm in men, and
» 88 cm in women.

Do urine test strip analysis for protein, blood and glucose at presentation.
» If normal, repeat urine test strip every 6 months.
» If abnormal, do spot urine albumin:creatinine ratio. Repeat yearly.
» If haematuria > 1+, investigate further.
» If glycosuria, exclude diabetes mellitus.
» If known diabetic, HbA_{1c} and fasting glucose.
» Random total cholesterol.
» If diabetic, do spot urine albumin creatinine ratio. Repeat yearly.
  > normal: <3 mg/mmol
  > microalbuminuria: 3–30 mg/mmol
  > macroalbuminuria: >30 mg/mmol or overt nephropathy.
» Perform a resting ECG to exclude left ventricular hypertrophy or ischaemia.
» Assess renal function (serum creatinine and eGFR).

Goals of treatment
Aim for SBP <140 mmHg and DBP <90 mmHg.

GENERAL MEASURES

Lifestyle modification
All persons with hypertension should be encouraged to make the following lifestyle changes as appropriate.

» Smoking cessation.
» Maintain ideal weight, i.e. BMI <25 kg/m^2. Weight reduction in the overweight patient.
» Salt restriction with increased potassium intake from fresh fruits and vegetables (e.g. remove the salt from the table, gradually reduce added salt in food preparation and avoid processed foods).
» Reduce alcohol intake to no more than 2 standard drinks per day for males and 1 for females.
» Follow a prudent eating plan i.e. low fat, high fibre and unrefined carbohydrates, with adequate fresh fruit and vegetables.
» Regular moderate aerobic exercise, e.g. 30 minutes brisk walking at least 3 times a week.

MEDICINE TREATMENT

Initial drug choice in patients qualifying for treatment is dependent on the presence of compelling indications**.**

Advise patient to take medication regularly, including on the day of the clinic visit.

Note:
Check adherence to antihypertensive therapy.
Monitor patients monthly and adjust therapy if necessary until the BP is controlled.
After target BP is achieved, patients can be seen at 3–6 monthly intervals.

Medicine treatment choices without compelling indications
Low risk: BP <160/100 mmHg, no risk factors, Target organ damage (TOD) or Associated clinical condition (ACC).

» Lifestyle modification for 3–6 months.
» Start antihypertensive therapy if target BP not achieved.

Moderate risk: BP <180/110 mmHg, 1–2 risk factors, no diabetes, TOD and/or ACC.

» Lifestyle modification for 3–6 months.
» Start antihypertensive therapy if target BP not achieved.

High or very high risk: BP >140/90 mmHg with 3 or more risk factors, diabetes, TOD and/or ACC.
Lifestyle modification with immediate antihypertensive therapy.

Low dose thiazide diuretic e.g.:
- Hydrochlorothiazide, oral, 12.5 mg daily.

If target blood pressure is not reached after one month despite adequate adherence, add one of the following: ACE inhibitor or calcium channel blocker.

- ACE inhibitor, e.g.:
- Enalapril, oral, 10 mg daily.

OR
- Long-acting calcium channel blocker, e.g.:
- Amlodipine, oral, 5 mg daily.

If target blood pressure is not reached after one month despite adequate adherence, add one of ACE inhibitor or calcium channel blocker, whichever has not already been used.

If target blood pressure is not reached after one month despite adequate adherence, add a β-blocker.

- β-blocker , e.g.:
- Atenolol, oral, 50 mg daily.

If target blood pressure is not achieved after one month despite adequate adherence, increase the dose of drugs, one drug every month, to their maximal levels: enalapril 10 mg 12 hourly, amlodipine 10 mg daily and hydrochlorothiazide 25 mg daily.

Note:
In 60–80% of patients a combination of the above antihypertensive therapy is needed. Combination therapy, i.e. hydrochlorothiazide plus a calcium channel blocker or ACE inhibitor should be considered at the outset in patients with BP >160/100 mmHg.

Medicine treatment choices with compelling indications

Compelling indications	Drug class
Angina	ß-blocker Calcium channel blocker
Coronary artery disease	ß-blocker ACE inhibitor If ß-blocker contraindicated: verapamil
Post myocardial infarction	ß-blocker ACE inhibitor
Heart failure	ACE inhibitor Carvedilol Spironolactone Hydrochlorothiazide or furosemide
Left ventricular hypertrophy	ACE inhibitor
Stroke	Hydrochlorothiazide ACE inhibitor
Diabetes type 1 or 2 with/without evidence of microalbuminuria or proteinuria	ACE inhibitor, usually in combination with a diuretic.*
Chronic kidney disease	ACE inhibitor, usually in combination with a diuretic.
Isolated systolic hypertension	Hydrochlorothiazide Calcium channel blocker
Pregnancy	See Chapter 6
Prostatism	Alpha-blocker

Caution
Lower BP over a few days.
A sudden drop in BP can be dangerous, especially in the elderly.
BP should be controlled within 1–6 months.