

- insulin, intermediate acting, SC, once or twice daily usually at night
Neutral Protamine Hagedorn (NPH) insulin.
Onset of action: 1–3 hours.
Peak action: 6–12 hours.
Duration of action: 16–24 hours.
- insulin, biphasic, SC, once or twice daily
Mixtures of regular human insulin and NPH insulin in different proportions,
e.g. $^{30}/_{70}$.
Onset of action: 30 minutes.
Peak action: 2–12 hours.
Duration of action: 16–24 hours.

SELECTION OF INSULIN

Basal bolus insulin

All type 1 diabetics should preferentially be managed with combined intermediate-acting (basal) and short-acting soluble insulin (bolus), the so-called basal bolus regimen. This consists of pre-meal short acting insulin and bedtime intermediate acting insulin not later than 22:00.

The initial total daily insulin dose should be calculated as 0.6-units/kg body weight. The total dose is divided into 50% basal insulin and 50% bolus insulin split equally for each meal. The dose is then adjusted on an individual basis.

Pre-mixed insulin

Twice daily pre-mixed insulin, i.e. a mixture of intermediate/short acting soluble insulin does not provide as good control but is a practical option for patients who cannot monitor blood glucose frequently.

INSULIN DELIVERY DEVICES

Due to cost, prefilled disposable pens should be reserved for special categories of patients, e.g. visually impaired patients and patients on the basal bolus regimen.

HOME GLUCOSE MONITORING

- patients on basal bolus insulin should measure glucose at least daily
- all type 2 patients on insulin should be given up to 25 strips per month for home glucose monitoring

GLUCAGON

Type 1 diabetics on tight control, i.e. basal bolus, who are judged to be at high risk of hypoglycaemia should have a glucagon hypoglycaemia kit and both the subject and the family should be educated how to use this emergency therapy.

8.6 DIABETIC EMERGENCIES

8.6.1 HYPOGLYCAEMIA

E83.5

DIAGNOSIS

CLINICAL

See above.

BIOCHEMICAL

Act on finger prick blood glucose. Confirm with laboratory measurements.

TREATMENT

1. Start immediately.
 - dextrose 50%, rapid IV injection, 50 mL
2. Assess clinical **and** biochemical response over the next 5–10 minutes.
3. Establish a large bore intravenous line and keep open with:
 - dextrose 10%, IV
4. If no clinical response give a second injection of:
 - dextrose 50%, IV, 50 mL
5. To prevent recurrent hypoglycaemia, continue infusion with:
 - dextrose 10%, IV infusion, at a rate of ± 1 L in 6 hours
6. Once blood glucose is normal or elevated, and the patient is awake, check blood glucose hourly for several hours, and check serum potassium for hypokalaemia.
7. If intravenous glucose cannot be given, for any reason, give:
 - glucagon, IM, 1 mg
Blood glucose will take 10–15 minutes to rise.
8. If the patient has not regained consciousness after **30 minutes** with a normal or elevated blood glucose, **look for other causes of coma**.

Once the patient is awake, give a snack, and **admit** to hospital for observation and for education, etc, to prevent further hypoglycaemic episodes.

If hypoglycaemia was caused by a sulphonylurea oral hypoglycaemic agent, the patient will require hospitalisation and an intravenous glucose infusion.
Observe patient for at least 12 hours after intravenous glucose infusion has stopped.

RECURRENT HYPOGLYCAEMIA

Consider the following in the case of recurrent hypoglycaemia:

- inappropriate management, e.g. too much insulin or too high dose of sulphonylurea
- poor compliance
- alcohol abuse
- factitious administration of insulin
- the honeymoon period of Type 1 diabetes
- the advent of renal failure
- hypoglycaemic unawareness
- pancreatic diabetes

Other causes of hypoglycaemia should also be considered e.g. associated Addison's disease or hypopituitarism.

Recurrent hypoglycaemia may be the cause of **hypoglycaemic unawareness**, which occurs frequently in Type 1 diabetic patients. The loss of warning symptoms can lead to severe hypoglycaemia. Evidence exists that in some cases this situation can be restored to normal with avoidance of hypoglycaemia.

8.6.2 DIABETIC KETOACIDOSIS (DKA) AND HYPEROSMOLAR NONKETOTIC COMA (HONK)

E10.0

DIABETIC COMAS – RECOGNITION AND CLINICAL PROFILES

DKA often occurs in the younger age and develops over hours to days. There may be vomiting, abdominal pain and acidotic breathing.

- blood glucose usually < 40
- blood ketones are positive
- serum osmolality < 350 mOsm/L.

HONK is a syndrome characterised by impaired consciousness, sometimes accompanied by seizures, extreme dehydration and severe hyperglycaemia, that is not accompanied by severe ketoacidosis. It usually occurs in the elderly type 2 diabetic and develops over days to weeks.

- blood glucose usually > 40
- blood ketones usually negative
- serum osmolality is > 320 mOsm/L.

Anion gap = $\text{Na} - (\text{Cl} + \text{HCO}_3)$ (N = ± 12 : DKA > 20)

Calculated serum osmolality = $2(\text{Na} + \text{K}) + \text{glucose} + \text{urea}$ (N = 275–285 mOsm/L)

NON-DRUG TREATMENT

ALL PATIENTS

Set up an intravenous line.

Protect airway and insert a nasogastric tube, if unconscious.

Monitor urine output.

Plasma glucose and ketones, urine and electrolytes and venous blood gas.

Look for precipitating causes, e.g. infection and MI.

DRUG TREATMENT

Fluids

Average deficit 6 L, may be as much as 12 L.

If renal or cardiac disease is present, monitor with central venous pressure.

In the absence of renal or cardiac compromise:

- sodium chloride 0.9%, IV, 15–20 mL/kg in the first hour
 - For patients < 20 years of age, initial volume: 10–20 mL/kg in the first hour.
 - Subsequent infusion rate varies from 5–15 mL/kg/hour depending on the clinical condition.
 - Correction of estimated deficits should take place over 24 hours.
 - The volume infused in the first 4 hours should not exceed 50 mL/kg.

Fluid therapy thereafter is calculated to replace the estimated deficit in 48 hours, ± 5 mL/kg/hour.
Reduction in serum osmolality should not exceed 3 mOsm/kg/hour.

Correct sodium for blood glucose.
Rough guide: divide glucose by 3 and add to sodium value.

If plasma Na^+ > 140 mmol/L:

- sodium chloride 0.45%, IV

If plasma Na^+ < 140 mmol/L:

- dextrose 5% or dextrose 5% in sodium chloride 0.9%, IV

Note:

Adjust fluid volumes according to clinical criteria.
If hypotension is still present after 2 hours, give 2 units of colloid.

Potassium

Potassium will fall on insulin and patients with DKA have potassium depletion even if initial potassium is normal or high.
It is therefore essential to replace potassium.

Total body deficit 300–1 000 mmol.
(1 ampoule = 20 mmol = 10 mL)

- potassium chloride, IV, added to 1 L of fluid
 - potassium < 3.5 mmol/L: add 40 mmol (2 ampoules)
 - potassium 3.5–5.5 mmol/L: add 20 mmol (1 ampoule)
 - potassium > 5.5 mmol/L: do not add any potassium
- Maximum potassium dose: 40 mmol/hour.
Monitor hourly initially, then 2 hourly when stabilised.

If serum potassium results are not readily available:

- potassium chloride, IV, 20 mmol (1 ampoule) added to 1 L of fluid as soon as the patient starts excreting urine

INSULIN THERAPY

Patients should be preferentially managed with protocol 1 in a high care ward, with appropriate monitoring.

PROTOCOL 1: continuous intravenous infusion

- insulin, soluble, short acting, IV infusion, 50 units in 200 mL sodium chloride 0.9%
1 mL of solution = 4 units insulin
 - initial infusion: 0.1 unit/kg/hour
Usually 5–7 units/hour: 20–28 mL/hour.

- if plasma glucose does not fall by 3 mmol/L in the first hour, double the insulin infusion (hourly) until a steady reduction of plasma glucose is achieved, i.e. at 3–4 mmol/L/hour
- if plasma glucose < 14 mmol/L, reduce the insulin infusion rate to 0.05–0.1 units/hour and adjust subsequently according to hourly bedside capillary glucose level with glucose test strips

Note:

Ketonaemia takes longer to clear than hyperglycaemia and combined insulin and glucose (and K⁺) are needed to ensure clearance of ketonaemia. Avoid focusing on glycaemia alone!

PROTOCOL 2: hourly intramuscular bolus injections

Where intravenous infusion cannot be safely administered:

- insulin, soluble, short acting
Loading dose: 0.5 units/kg body weight.
Give half the dose as an intravenous bolus injection and the other half IM.
Dilute 100 units with sodium chloride 0.9% to 10 mL i.e. 10 units/mL.
Do not give with an insulin syringe and needle as this would be subcutaneous.
Subsequent hourly doses: ± 5–10 units IM every hour (i.e. 0.1 units/kg/hour) and titrated against the bedside capillary glucose level.

Criteria for resolution of DKA**Note:**

Plasma glucose level is not the main criteria. Ketosis and acidosis must be resolved.

PROGRESS MANAGEMENT

Continue protocols 1 or 2 until the acidosis has resolved and:

- the patient is able to eat
- when subcutaneous insulin therapy can be instituted either at previous doses or, for newly diagnosed diabetes at 0.5–1 unit/kg total daily dose divided into at least 2 doses with mixed short and long acting insulin (biphasic insulin ²/₃ in the morning and ¹/₃ at night).

Infusion must overlap with subcutaneous regimen for 1–2 hours to avoid reversion to acidosis.

Bicarbonate

There is no proven role for the use of bicarbonate and it could potentially cause harm.

CEREBRAL OEDEMA

May occur with over-aggressive fluid replacement.

If treatment is necessary, See Section 14.11.1: Brain Oedema due to Tumors and Inflammation.

8.7 MICROVASCULAR COMPLICATIONS (NERVES, KIDNEYS, EYES)

E10.2/E10.3/E10.4

DESCRIPTION**DIABETIC NEUROPATHIES**

Neuropathies are a common complication of diabetes. They play an important role in the increased morbidity and mortality suffered by people with diabetes.

There are three major categories:

- peripheral neuropathy
- autonomic neuropathy
- acute onset neuropathies

DRUG TREATMENT

Improve glycaemic control.

Exclude or treat other contributory factors:

- alcohol excess
- vitamin B₁₂ deficiency, if suspected
- uraemia

Pain

- paracetamol, oral, 1 g every 6 hours as needed
- amitriptyline, oral, 10–25 mg at night increasing to 75 mg, if necessary

If ineffective, consider adding:

- carbamazepine, oral, 100 mg daily increasing to 200 mg twice daily if necessary

Gastroparesis

- metoclopramide, oral, 10 mg three times daily before meals
If ineffective consult a specialist.

8.7.1 DIABETIC KIDNEY DISEASE

N18

See Section 7.1.1 Chronic Kidney Disease (CKD).

8.7.2 DIABETIC FOOT ULCERS

L97

NON-DRUG TREATMENT

Metabolic control and treatment of comorbidity.

Relieve pressure: non-weight bearing is essential.

Smoking cessation.

DEEP (LIMB-THREATENING) INFECTION

X-ray of affected limb.

Surgical drainage as soon as possible with removal of necrotic or poorly vascularised tissue, including infected bone – refer urgently.

Revascularisation, if necessary.

LOCAL WOUND CARE

Frequent wound debridement with scalpel, e.g. once a week.

Frequent wound inspection.

Absorbent, non-adhesive, non-occlusive dressings.

DRUG TREATMENT**SUPERFICIAL ULCER WITH EXTENSIVE INFECTION**

Debridement with removal of all necrotic tissue.

Antibiotic therapy

For polymicrobial infection.

Topical antibiotics are not indicated.

Duration of therapy: 10 days but longer courses may be necessary.

- amoxicillin/clavulanic acid, oral, 625 mg 8 hourly

SEVERE INFECTION

- cloxacillin, IV, 2 g 6 hourly

PLUS

- metronidazole, oral, 400 mg, 8 hourly

PLUS

- gentamicin, IV, 5 mg/kg/day

Penicillin allergy:

- clindamycin, oral, 150 mg 8 hourly

PLUS

- gentamicin, IV, 5 mg/kg/day

Renal impairment

Replace gentamicin plus cloxacillin with 3rd generation cephalosporin, i.e.:

- ceftriaxone, IV, 2 g daily

PLUS

- metronidazole, oral, 400 mg, 8 hourly

REFERRAL

- arterial revascularisation procedures

8.8 MACROVASCULAR COMPLICATIONS**SECONDARY PREVENTION**

Diabetic patients with a history of myocardial infarction, vascular bypass, stroke or transient ischemic attack, peripheral vascular disease, claudication, or angina.

PRIMARY PREVENTION

Any diabetic patient with an additional cardiovascular risk factor, e.g. age > 40 years, cigarette smoking, hypertension, obesity, albuminuria, hyperlipidaemia, or a family history of coronary heart disease.

- aspirin, soluble, oral, 75–150 mg daily

HYPERTENSION

See Section 3.5: Hypertension

DYSLIPIDAEMIA

See Section 8.9: Dyslipidaemia

8.9 DYSLIPIDAEMIA

E78

DESCRIPTION

Non-pharmacological therapy plays a vital role in the management of dyslipidaemia. Many patients with mild or moderate dyslipidaemia will be able to achieve optimum lipid levels with lifestyle modification alone and may not require lifelong lipid modifying therapy.

Accompanying modifiable risk factors for CAD e.g. hypertension, smoking, diabetes, must be looked for and treated.

Underlying secondary causes of dyslipidaemia, e.g. excess alcohol intake, hypothyroidism, should be identified and corrected.

The goal of treatment should be clearly explained to the patient and the risks conferred by untreated dyslipidaemia should be emphasised.

NON-DRUG TREATMENT

Lifestyle modification:

- dietary strategies are effective
 - substituting unsaturated fats (mono- and polyunsaturated fats) for saturated fats
 - consuming a diet high in fruits, vegetables, nuts and whole refined grains
- smoking cessation
- increase physical activity
- maintain ideal body weight

DRUG TREATMENT**INDICATION FOR DRUG THERAPY**

- ischaemic heart disease
- peripheral vascular disease
- atherothrombotic stroke
- a risk of MI of greater than 20% in 10 years

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

CALCULATION OF ABSOLUTE RISK OF MYOCARDIAL INFARCTION OVER 10 YEARS (IN THE ABSENCE OF ISCHAEMIC HEART DISEASE AND MONOGENETIC DYSLIPIDAEMIA)

To derive the absolute risk as percentage of subjects who will have a myocardial infarction over 10 years: Add the points for each risk category (men – section A; women – section B).

The risk associated with the total points is then derived from section C (for men and women).

Section A: Men

Age (years)	Points
30–34	–1
35–39	0
40–44	1
45–49	2
50–54	3
55–59	4
60–64	5
65–69	6
70–74	7

Total cholesterol	Points
< 4.1 mmol/L	–3
4.2–5.2	0
5.3–6.2	1
6.3–7.2	2
> 7.2	3

HDL cholesterol	Points
<0.91 mmol/L	2
0.91–1.16	1
1.17–1.29	0
1.3–1.55	0
> 1.55	–2

Blood pressure*	Points
< 120 / < 80	0
120–129 / 80–84	0
130–139 / 85–89	1
140–159 / 90–99	2
≥160 / ≥ 100	3

Section B: Women

Age (years)	Points
30–34	–9
35–39	–4
40–44	0
45–49	3
50–54	6
55–59	7
60–64	8
65–69	8
70–74	8

Total cholesterol	Points
< 4.1 mmol/L	–2
4.2–5.2	0
5.3–6.2	1
6.3–7.2	1
> 7.2	3

HDL cholesterol	Points
< 0.91 mmol/L	5
0.91–1.16	2
1.17–1.29	1
1.3–1.55	0
> 1.55	–3

Blood pressure*	Points
< 120 / < 80	–3
120–129 / 80–84	0
130–139 / 85–89	0
140–159 / 90–99	2
≥160 / ≥ 100	3

Other	Points
Non-smoker	0
Smoker	2
Not diabetic	0
Diabetic	2

Other	Points
Non-smoker	0
Smoker	2
Not diabetic	0
Diabetic	4

* Use the highest reading of either diastolic or systolic pressure (mmHg).

Section C: Risk (% of cohort defined by the score who will have a myocardial infarction in 10 years)

Total points	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Men (%)		2	3	3	4	5	7	8	10	13	16	20	25	31	37	45	>53			
Women (%)	1	2	2	2	3	3	4	4	5	6	7	8	10	11	13	15	18	20	24	>27

The score is gender dependent: for example, 6 points for men and 10 for women both have a 10% risk.

CARDIOVASCULAR

The main indication for lipid modifying medication is to reduce cardiovascular risk. Drug therapy should be considered when non-pharmacological means have failed to reduce the lipid levels to within the target range. When lipid-lowering drugs are used, this is ALWAYS in conjunction with ongoing lifestyle modification.

NON-CARDIOVASCULAR

The most serious non-cardiovascular complication of dyslipidaemia is the development of acute pancreatitis. This is seen in subjects with severe hypertriglyceridaemia (fasting triglycerides >15 mmol/L). Ideally such patients should be referred to a lipid specialist.

The basic principles are:

- control or reverse possible secondary factors, e.g. alcohol excess and diabetes
- introduce a very low fat diet
- lipid modifying drug therapy.
 - Fibric acid derivatives are the drugs of choice for severe hypertriglyceridaemia.

Choice of drug

Depends on the type of lipid disturbance:

- predominant hypercholesterolaemia: HMGCoA reductase inhibitors (statin)
- mixed hyperlipidaemia: HMGCoA reductase inhibitors (statin) or Fibric acid derivatives
- predominant hypertriglyceridaemia: Fibric acid derivatives

If lifestyle modification does not achieve lipid goals within 3 months:

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

- simvastatin, oral, 10 mg daily

OR

Fibric acid derivatives e.g.:

- bezafibrate, oral, 400 mg daily
Fibric acid derivatives should be used for patients with moderate to severe **fasting** hypertriglyceridaemia and for patients on ARV therapy i.e. triglycerides > 10 mmol/L.

People with protease inhibitor induced dyslipidaemia fulfilling the above criteria should be treated with a fibric acid derivative because of adverse drug reactions with statins.

REFERRAL

- people with FH
- suspected severe familial dyslipidaemias

8.10 HYPERCALCAEMIA, INCLUDING PRIMARY HYPERPARATHYROIDISM

E83.5/E21.0

DESCRIPTION

When serum calcium (corrected for albumin) concentrations exceed the upper limit of normal.

AETIOLOGY

- ambulatory patients: hyperparathyroidism is the most common cause in > 90% of cases.
- in hospitalised patients: malignancies are the most common cause (65% of cases). Hyperparathyroidism accounts for another 25%.
- granulomatous disease (Sarcoid)
- immobilisation in those with high bone turnover

INVESTIGATIONS

Draw blood for PTH and a simultaneous calcium and albumin.

A detectable PTH in the presence of hypercalcaemia indicates primary hyperparathyroidism.

DRUG TREATMENT**HYPERCALCAEMIA**

Patients with hypercalcaemia should be kept well hydrated and may need several litres of fluid.

Avoid thiazide diuretics as it increases serum calcium concentration.

For hypercalcaemia plus symptoms:

- sodium chloride solution 0.9%, IV infusion, 4–6 L/24 hours

PLUS

- furosemide, IV, 10–20 mg 6–12 hourly
Observe urine output carefully.

Furosemide should not be given until the patient is well hydrated.

If after 24 hours and adequate hydration and still symptomatic, serum calcium is still over 3 mmol/L :

ADD

Bisphosphonates (specialist initiated) e.g.:

- pamidronic acid, IV infusion, according to plasma calcium concentration, 30 mg over 1–4 hours
Dilute each 15 mg in 125 mL sodium chloride solution 0.9% and admister over 1 hour.
Doses should not repeated until after 7 days.

In patients with granulomatous disease and haematological malignancies:

- prednisone, oral, 40 mg daily

REFERRAL

- when a diagnosis of hyperparathyroidism is confirmed

8.11 HYPOCALCAEMIA

E83.5

DESCRIPTION

When serum calcium (corrected for albumin) fall below the lower limit of normal.

CAUSES

- renal failure
- hypoparathyroidism
- post neck surgery
- radiotherapy or idiopathic
- vitamin D related, deficient intake, activation or action
- hypomagnesaemia
- malabsorption syndrome

INVESTIGATIONS

Laboratory: calcium, albumin, phosphate, urea, creatinine, magnesium and PTH.

DRUG TREATMENT

Directed at underlying cause.

For hypoparathyroidism:

- calcium, elemental, oral, 500–1 500 mg/day

For acute hypocalcaemia with neurological problems:

- calcium gluconate 10%, IV, 10 mL administered over 15–30 minutes
This may be repeated and/or add calcium gluconate 10%, 20–30 mL to 1 L dextrose 5% and infuse over 12–24 hours.
Monitor closely with ECG.
- alfacalcidol, oral, 1–3 mcg daily

Renal failure

See Section: 7.1.1: Chronic Kidney Disease (CKD).

REFERRAL

- if cause is uncertain
- if hypoparathyroidism considered and PTH analysis required as above

8.12 HYPOTHYROIDISM

E30.9

CAUSES

Common causes of primary hypothyroidism are thyroiditis, post-surgery and post-radiodine.

Secondary hypothyroidism may be due to any cause of anterior hypopituitarism.

INVESTIGATIONS

TSH and T₄ initially and for monitoring adequacy of therapy.

DRUG TREATMENT

- levothyroxine, oral, 100 mcg daily
If TSH and T₄ are low this suggests hypopituitarism. Give hydrocortisone replacement before starting levothyroxine.
If there is a risk of ischaemic heart disease, start at 25 mcg daily and increase by 25 mcg every 4 weeks.
Check TSH and T₄, after 2–3 months and adjust dose if required.
TSH levels will take several months to stabilise.
Once stable check T₄ and TSH annually.

HYPOTHYROIDISM IN PREGNANCY

About 60% of hypothyroid pregnant women need an increase in thyroxine therapy in the second and third trimesters. Check TSH monthly and increase thyroxine doses to keep serum TSH levels low normal. After delivery, revert to pre-conception doses.

8.13 OSTEOPOROSIS

M81.9

DESCRIPTION

A disease characterised by low bone mass and micro-architectural bone deterioration leading to bone fragility and increase in fracture risk.

NON-DRUG TREATMENT

Adequate energy and protein intake.

Adequate dietary calcium (>1 g/day) intake particularly in the young, in breastfeeding mothers and in the elderly.

Weight bearing exercises, e.g. brisk 30 minutes walk 3 times a week.

Smoking cessation.

Avoid excessive alcohol, i.e. > 10 drinks/week.

Avoid falls:

- avoid sedating drugs especially in the elderly
- manage visual, mental and/or balance impairment

- weakness
- sarcopenia
- environmental hazards
- history of falls

DRUG TREATMENT

Calcium supplementation

Preferably dietary, but few achieve RDA and supplements usually required.

- calcium, elemental, oral, 500–1 000 mg daily
Calcium carbonate to be taken with meals. Other calcium salts can be taken between meals.

Vitamin D supplementation

In the elderly, the institutionalised and those who wear protective clothes:

- vitamin D, oral, 400–800 units/day
- When concomitant osteomalacia is present:
- vitamin D, oral, 50 000 units every 1–2 weeks

Hormone Replacement Therapy

See Section 5.4: Menopause and Perimenopausal Syndrome.

REFERRAL

- to establish diagnosis (bone densitometry)
- for initial assessment
- initiation and monitoring response to therapy and 18–24 monthly BMD
- fractures suspected to be due to osteoporosis after initial management for consideration of bisphosphonate therapy

8.14 OSTEOMALACIA / RICKETS

M83.9

DESCRIPTION

A disorder of mineralisation of newly synthesised bone matrix.

REFERRAL

- all

8.15 PAGET'S DISEASE

M88.9

DESCRIPTION

This bone disease is characterised by localised uncontrolled formation of highly active osteoclasts leading to an increase in bone resorption followed by chaotic increase in bone formation.

NON-DRUG TREATMENT

Most cases are mild and asymptomatic and no treatment is required.

Avoid high calcium diet when immobile as hypercalcaemia may occur with immobilisation. Differentiate bone pain of Paget's, especially at night, from arthritic pain in joints near deformed bone, e.g. hip and knee joints, as well pain resulting from fracture or complicating osteosarcoma.

DRUG TREATMENT

After referral for diagnosis and initiation of therapy.

For pain:

- ibuprofen, oral, 400 mg 8 hourly

REFERRAL

- basal skull involvement
- severe pain not responding to NSAIDs
- Pagetic fracture

8.16 PITUITARY DISORDERS

8.16.1 PROLACTINOMA

D35.2

DESCRIPTION

Prolactinoma is the most common functioning pituitary tumour.

INVESTIGATIONS

- serum prolactin

Note:

There are numerous causes of hyperprolactinaemia other than a prolactinoma, e.g. drugs, physiological, hypothyroidism, chronic renal failure and tumours. Elevated serum prolactin levels up to 200 ng/mL may also be found in other pituitary tumours and hypothalamic-pituitary lesions with stalk compression.

DRUG TREATMENT

Dopamine agonist therapy is the treatment of choice.

- bromocriptine, oral, 1.25 mg at bedtime with a snack
Initial maintenance dose: increase dose to 2.5 mg twice a day with food and check prolactin 4 weeks later.
Higher doses may be needed.
GIT side effect minimised by giving doses with food.
If total dose of 10 mg does not normalise prolactin, refer.

URGENT REFERRAL

- compression of optic chiasm
- pituitary apoplexy

REFERRAL

- all tumours, once secondary causes of hyperprolactinaemia have been sought and excluded

8.16.2 ANTERIOR HYPOPITUITARISM

E23.0

DESCRIPTION

Absent or diminished secretion of one or more anterior pituitary hormones due to primary damage of the anterior pituitary gland or secondary due to hypothalamic dysfunction, which may result in hypothyroidism and/or hypoadrenalism and/or hypogonadism.

NON-DRUG TREATMENT

Surgery is required for large tumours, pituitary apoplexy, and hormone secreting tumours (prolactinoma excluded).
An alert bracelet is needed.

DRUG TREATMENT**ACUTE CRISIS**

Treat as for Acute crisis in section 8.2: Adrenal Insufficiency (Addison's Disease).

CHRONIC

See Section 8.2: Adrenal Insufficiency (Addison's Disease)
8.12: Hypothyroidism.

HYPOADRENALISM

See Section 8.2: Adrenal Insufficiency (Addison's Disease)
8.12: Hypothyroidism.

HYPOTHYROIDISM

See Section 8.12: Hypothyroidism

HYPOGONADISM

Individualise dosage and need for replacement.

Women:

As for postmenopausal HRT: See Section 5.4.

Men:

- testosterone, IM, 300 mg every 3–4 weeks

REFERRAL

- all diagnosed patients for initial assessment

8.16.3 DIABETES INSIPIDUS (POSTERIOR HYPOPITUITARISM)

E23.2

DESCRIPTION

Damage to the posterior pituitary leading to deficient production of antidiuretic hormone. Characterised by the passage of copious amounts of very dilute urine. Causes include head trauma and neurosurgery and are most often idiopathic.

NON-DRUG TREATMENT

Rehydration with water or hypotonic fluids.

DRUG TREATMENT**Replacement therapy**

- desmopressin aqueous solution 100 mcg/mL, 10–40 mcg (0.05–0.4 mL) daily, delivered nasally:
 - nasal spray, 10 mcg/spray (0.1 mL) once or twice daily
- OR**
- nasal solution, 5–20 mcg once or twice daily via calibrated plastic catheter
- OR**
- desmopressin, oral, 0.2–1.2 mg daily
- Optimal dose: 0.1–0.2 mg three times daily

ACUTE MANAGEMENT

Post operatively:

- vasopressin, IV, 1–4 mcg once or twice daily
- Larger doses can lead to water overload and hyponatraemia.

REFERRAL

- all diagnosed patients
- Water deprivation and vasopressin test is necessary to confirm the diagnosis.
- Careful monitoring on therapy is essential to ensure appropriate dose by way of electrolytes and exclusion of fluid overload.

8.17 PHEOCHROMOCYTOMA

C74.9

DESCRIPTION

Catecholamine-secreting tumour of the adrenal medulla.

CLINICAL PRESENTATION

Always consider in hypertensive patients that have paroxysmal symptoms:

- | | |
|----------------|------------------------------|
| ○ headaches | ○ tremor |
| ○ diaphoresis | ○ recurrent chest discomfort |
| ○ palpitations | ○ sweating |
| ○ anxiety | ○ GIT symptoms |

There is marked interindividual variation of symptoms.

These hypertensive patients may have orthostatic changes in blood pressure.

DIAGNOSIS

24 hour urine containing HCl, normetanephrine (NMA), vanillylmandelic acid (VMA), should be twice normal.

Test is best to be done after a paroxysm using at least 2 samples.

There are many drugs, foods and diseases that can falsely elevate or lower NMA/VMA levels therefore the clinician must interpret the results in the light of the clinical context and after having taken an accurate history.

Who to screen

- young hypertensives
- hypertensive patients with paroxysmal symptoms
- patients with:
 - a labile BP
 - a family history of a pheochromocytoma
 - radiologic evidence of an adrenal mass

NON-DRUG TREATMENT

Surgical removal of the tumour.

DRUG TREATMENT

Alpha blocker, e.g.:

- doxazocin, oral

Calcium channel blockers may be added, e.g.:

- amlodipine, oral, 5–10 mg once daily

REFERRAL

- all patients with elevated levels of NMA and VMA for localisation studies (MIBG scanning and CT scanning)
- when there is a suggestive clinical presentation but negative screening test

8.18 PRIMARY ALDOSTERONISM

E26.0

DESCRIPTION

Increased aldosterone production usually due to an adrenal adenoma (65%, Conn's Syndrome) or idiopathic bilateral adrenal hyperplasia (30%).

CLINICAL

Always suspect in a patient with resistant hypertension or hypertension and hypokalaemia.

DIAGNOSIS

Plasma aldosterone-renin ratio

ACE-inhibitors, angiotensin receptor blockers (ARBs), and diuretics can give falsely elevated or lowered results. Stop all these drugs for a minimum of 2 weeks prior to testing. Stop spironolactone for 6 weeks prior to testing.

Because of limited specificity, a positive screening test result should be followed by a confirmatory test and a negative random ratio test does not necessarily exclude the diagnosis.

DRUG TREATMENT**ADRENAL ADENOMA**

Adrenalectomy:

- spironolactone, oral, 100–200 mg daily

BILATERAL HYPERPLASIA

Standard anti-hypertensive therapy.

REFERRAL

- all patients to an endocrinologist or a hypertension centre for confirmation of the diagnosis and further treatment

8.19 HYPERTHYROIDISM

E05

DESCRIPTION

Most common cause of hyperthyroidism is Graves' disease, which is an autoimmune condition resulting from the presence of TSH stimulating auto-antibodies.

INVESTIGATION

Request TSH and T_4 . If TSH suppressed and T_4 normal, request in addition T_3 . The usual biochemical abnormalities, however, are:

Diffuse goiter with bruit (Graves')

- Ophthalmopathy
- Pretibial myxoedema
- Family history

Thyroiditis

- Toxic multinodular
- Goiter small to large
- Older patients
- Obstructive surgery
- Cardiac manifestations

Thyroid nodule

- Moves on swallowing.

If diagnosis is uncertain: request thyroid uptake scan: If uptake is:

- elevated or diffuse: Graves' disease
- markedly decreased: Thyroiditis
- patchy, normal or increased: Toxic multinodular goiter

REFERRAL

- consultation with a specialist is recommended in all cases
- for thyroid scan if necessary
- thyroid associated ophthalmopathy
- when radioactive iodine or surgery is contemplated

8.19.1 GRAVES' HYPERTHYROIDISM

E05.0

DRUG TREATMENT

- carbimazole, oral, 30–45 mg once daily
Titrate dose according to thyroid hormone levels (T_4).
Duration of therapy: 12–18 months.

 β -blockers

Used to counteract excessive sympathetic symptoms, e.g. palpitations.

Dose is titrated by the heart rate.

Give for 2–4 weeks.

- propranolol, oral, 20–40 mg twice daily
Titrate dose upwards as needed.

OR

atenolol, oral, 50 mg daily

Radioactive iodine

In the setting of Graves' disease radioactive iodine may be administered for failed medical therapy and may be indicated for patients with coexistent heart disease. It is contraindicated in active thyroid associated ophthalmopathy.

SURGERY

Consider if the thyroid is very large or if there is failure of antithyroid drug therapy.

MONITORING

Patients with Graves' disease who are treated with antithyroid drugs should be monitored every 6–8 weeks using a serum T_4 . TSH may remain suppressed for months. Once in remission, patients may be monitored less frequently to determine signs and symptoms of recrudescence of thyrotoxicosis.

Because there is a risk of neutropaenia with carbimazole, a FBC must be done in patients presenting with an infection or sore throat.

Post-radioiodine TSH and T_4 should be checked at 6 weeks, 3, 6, 9 and 12 months and annually thereafter until either hypothyroidism occurs or patient remains euthyroid for \pm 3–4 years. Although uncommon, hypothyroidism can occur years later.

8.19.2 TOXIC MULTINODULAR GOITER

E05.2

DRUG TREATMENT**Radioactive iodine**

Radioactive iodine is the treatment of choice. Medical therapy is indicated initially for patients with underlying heart disease to achieve euthyroidism prior to radioactive iodine. Surgery is restricted to patients with obstructive symptoms.

8.19.3 SINGLE TOXIC NODULES

E05.1

DRUG TREATMENT**Radioactive iodine**

Smaller nodules are best managed with radioactive iodine while larger nodules may require surgery.

 β -blockers

Used to counteract excessive sympathetic symptoms, e.g. palpitations.

Dose is titrated by the heart rate.

Give for 2–4 weeks.

- propranolol, oral, 20–40 mg twice daily
Titrate dose upwards as needed.

OR

atenolol, oral, 50 mg daily

8.19.4 THYROIDITIS

E06

DRUG TREATMENT **β -blockers**

Used to counteract excessive sympathetic symptoms, e.g. palpitations.

Dose is titrated by the heart rate.

Give for 2–4 weeks.

- propranolol, oral, 20–40 mg twice daily
Titrate dose upwards as needed.

OR

atenolol, oral, 50 mg daily

NSAIDs, e.g.:

- ibuprofen, oral, 400 mg three times daily

OR

For painful subacute thyroiditis (De Quervain's):

- prednisone, oral, 40 mg daily. Specialist consultation.

8.19.5 THYROID CRISIS

E05.5

DRUG TREATMENT

IV fluids as indicated.

- carbimazole, oral, 30 mg 6 hourly **followed after 30 minutes by** 10 drops of Lugol's iodine in milk 3 times daily
Start with second dose of carbimazole and continue until crisis is controlled.

PLUS

- propranolol, oral, 60–120 mg 6 hourly
Treat precipitating illness and infection.
ICU admission is desirable.



CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

9.1 HOSPITAL-ACQUIRED INFECTIONS

T80–88

DEFINITION AND PRINCIPLES

Infections acquired after 48 hours of hospitalisation.

Many anatomical sites can be involved and only the four most common will be discussed.

It is essential to obtain specimens for culture and sensitivity testing in all cases prior to antibiotics, as multi-drug resistant organisms are common causes of hospital-acquired infections.

Infections acquired in the intensive care unit are much more likely to be due to multi-drug resistant organisms.

Empiric therapy suggestions below are only rough guidelines. Close liaison with regional microbiologists and regular review of hospital antibiotic policy is essential.

9.1.1 INTRAVASCULAR LINE INFECTIONS

T80

DESCRIPTION

Common organisms:

- coagulase negative staphylococci
- *S. aureus*.

The line should always be withdrawn. In many cases, especially with coagulase negative staphylococci, the infection will resolve on removal of the catheter.

Note:

Candida isolated from blood culture should **always** be treated, even if the fever has settled after line removal.

Microbiologic specimen: blood culture and catheter tip.

DRUG TREATMENT

Empiric antibiotic therapy

Duration of antibiotic therapy should generally be for 48–72 hours after resolution of fever **except** for:

- confirmed *S. aureus* infection: 4 weeks required. Switch to oral flucloxacillin after 14 days may be acceptable.
- candida: 2 weeks after resolution of fever

- cloxacillin, IV, 2 g 6 hourly

For confirmed *S. aureus* infection, duration of therapy is 4 weeks.

After 14 days, switch to:

- flucloxacillin, oral, 500 mg 6 hourly

OR

If penicillin allergy or known high rate of cloxacillin resistance:

- vancomycin, IV, 1 g 12 hourly



CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

CANDIDAEMIA

- amphotericin B, IV, 0.7 mg/kg daily

OR

If renal failure or intolerance of amphotericin B:

- fluconazole, oral, 800 mg, immediately followed by 400 mg daily

9.1.2 SURGICAL WOUND INFECTIONS

T81

DESCRIPTION

Common organism:

- *S. aureus*.

Microbiologic specimen: deep wound swab or aspirate of pus and blood culture.

Antibiotics are not usually necessary.

DRUG TREATMENT

Empiric antibiotic therapy

If surrounding cellulitis or systemic sepsis:

- cloxacillin, IV, 2 g 6 hourly

Penicillin allergy:

- vancomycin, IV, 1 g 12 hourly

9.1.3 HOSPITAL-ACQUIRED PNEUMONIA

J13

DESCRIPTION

Common organisms:

- *S. pneumoniae*, especially early in admission
- resistant aerobic Gram-negative organisms including *K. pneumoniae*, *P. aeruginosa* and *Acinetobacter* spp, the latter found especially in ICU
- cloxacillin-resistant *S. aureus* is mainly found in ICU

Microbiologic specimen: blood culture and sputum/tracheal aspirate.

DRUG TREATMENT

Empiric antibiotic therapy

For ward cases:

- benzylpenicillin (Penicillin G), IV, 2 million units 6 hourly

PLUS

- amikacin, IV, 15 mg/kg daily

Penicillin allergy:

- vancomycin, IV, 1 g 12 hourly

OR

clindamycin, IV, 600 mg 8 hourly

PLUS

- ciprofloxacin, oral, 500 mg 12 hourly

CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

VENTILATOR ASSOCIATED PNEUMONIA

Choice will depend on local susceptibility patterns. One or more of the following antibiotics/classes need to be available:

- piperacillin/tazobactam, IV, 4.5 g 8 hourly
OR
cefepime, IV 1 g 12 hourly
OR
A carbapenem, eg.:
meropenem, IV, 1 g 8 hourly

9.1.4 URINARY TRACT INFECTIONS

N39.0

DESCRIPTION

Common organisms:

- resistant aerobic Gram-negative organisms

Microbiologic specimen: blood culture and MSU/CSU.

DRUG TREATMENT

Empiric antibiotics:

- amikacin, IV, 15 mg/kg daily
OR
ciprofloxacin, oral, 500 mg 12 hourly
Duration of therapy 7–14 days.

9.2 ADULT VACCINATION

Vaccine	Indications	Comments
Influenza vaccine	<ul style="list-style-type: none">○ COPD○ frail elderly○ high risk patients○ healthcare workers with direct patient contact	Contraindication: egg allergy. Dose: IM, 0.5 mL. Repeat annually.
Pneumococcal vaccine (23 valent polysaccharide)	<ul style="list-style-type: none">○ patients without a spleen○ chronic cerebrospinal fluid (CSF) leak	Contraindication: pregnancy. Booster: every 5 years. Dose: SC/IM, 0.5 mL.
Hepatitis B vaccine	<ul style="list-style-type: none">○ high risk groups, e.g. hospital personnel or sexual contacts of infected patients○ sexual assault	Dose: IM, 1 mL immediately then 1 mL after 1 month and 1 mL 6 months after first dose.
Tetanus toxoid vaccine	Booster when there is a high risk for tetanus e.g. contaminated wound or pregnant women to prevent neonatal tetanus.	Dose: IM, 2.5 mg/0.5 mL.
Rubella vaccine	Pre-conception in non-immunised women	Contraindication: pregnancy. Dose: SC, 0.5 mL.



CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

9.2.1 RABIES VACCINATION

Z24.2

For prevention of disease in patient exposed to a suspected rabid animal, it is important to estimate risk of rabies first by assessment of the following:

- type of contact. Higher risk for penetrating bites/scratches.
- incidence of rabies in the animal's district of origin
- higher risk with abnormal animal behaviour
- species of animal involved. High risk: domestic dog, cat, cattle, black backed jackal, bat eared fox, mongoose species, amongst others.
- higher risk if animal not vaccinated
- negative rabies laboratory testing, where available
- when the biting animal cannot be found, or the brain is not available for laboratory examination, it should be assumed that the animal was infected

PATIENT NOT PREVIOUSLY IMMUNISED

Active immunisation with HDCV:

- rabies inactivated whole virus vaccine, IM, 1 dose on 0, 3, 7, 14 and 28 days post exposure, according to the standard or essential schedule
Administer vaccine by deep IM injection in the deltoid region and not the thigh or buttock.

Caution: anaphylaxis.

If patient presents after 48 hours, administer double initial dose on day zero.

AND

Passive immunisation, for temporary prophylaxis with RIG:

- rabies immunoglobulin (RIG), 20 units/kg on day 0 or within 7 days after exposure
Half the dose is infiltrated around the wound and give the rest IM.
It is recommended that RIG be given simultaneously with the vaccine but into a different injection site if wound is not older than 7 days and only for patients not previously immunised.

PATIENT NOT PREVIOUSLY IMMUNISED

- rabies inactivated whole virus vaccine, IM, 1 dose on day 0 and day 3
In these cases RIG (see above) is not given.
Caution: anaphylaxis.
If patient presents after 48 hours, double initial dose on day zero.

CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

Risk category	Type of exposure	Action
1	<ul style="list-style-type: none"> ○ touching or feeding animal ○ licking intact skin 	<ul style="list-style-type: none"> ○ none if reliable history
2	<ul style="list-style-type: none"> ○ nibbling uncovered skin ○ superficial scratch without bleeding ○ licking broken skin 	<ul style="list-style-type: none"> ○ wound treatment ○ give rabies vaccine ○ do not give anti-rabies immunoglobulin, except in HIV infected people ○ stop vaccination if laboratory tests of animal are negative for rabies or animal, i.e. dog or cat remains well after 10 days observation.
3	<ul style="list-style-type: none"> ○ bites or scratches ○ penetrating skin and drawing blood ○ licking of mucous membranes 	<ul style="list-style-type: none"> ○ wound treatment ○ give rabies vaccine ○ give anti-rabies immunoglobulin (RIG) ○ give tetanus toxoid vaccine and antibiotic ○ stop vaccination if laboratory tests of animal are negative for rabies or animal, i.e. dog or cat remains well after 10 days observation.

Rabies Vaccine

Must be given for category 2 and 3 bites.

Vaccine is administered on days 0, 3, 7, 14, 28. Vaccine is ideally given as soon as possible after exposure, but should still be given if patient presents some time after the exposure.

If vaccine administration is delayed > 48 hours, a double dose should be given initially.

Rabies vaccine is given IM but never in the buttock. Give into deltoid muscle in adults.

Adverse events are uncommon and include:

- local reactions
- pain
- erythema
- swelling or itching at the injection site
- systemic reactions
- vomiting
- fever
- arthralgia
- arthritis
- angioedema
- nausea
- malaise

CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

Rabies Immunoglobulin (RIG)

Must be given for category 3 bites only and for category 2 bites with HIV infected people.

Always give the vaccine first.

Immunoglobulin must be given as soon as possible after exposure, but may be administered up to 7 days after the first vaccine is given.

Do not give RIG if the patient has previously received pre- or post-exposure prophylaxis.

- rabies immunoglobulin, 20 units/kg
Infiltrate around wound with up to 50% of dose.
Administer remaining immunoglobulin into deltoid muscle opposite to vaccine administration site.

If multiple wounds, dilute in sodium chloride 0.9% to 2–3 times so that all wounds are infiltrated.

Do not exceed maximum dose as antibody production to the vaccine is inhibited. If unavailable, **do not** delay active immunisation.

9.3 BRUCELLOSIS

A23.10

*This is a notifiable disease.

DESCRIPTION

Zoonotic infection, usually due to *B. abortus* in South Africa. Infection is usually acquired from unpasteurised milk products or handling raw meat.

DRUG TREATMENT

- doxycycline, oral, 100 mg 12 hourly for 6 weeks

PLUS

- streptomycin, IM, 1 g daily for 3 weeks
Preferred regimen for osteo-articular or cardiac involvement.

OR

- rifampicin, oral, 15 mg/kg/day 12 hourly for 6 weeks

9.4 HAEMORRHAGIC FEVER SYNDROME

A98.0

Severe bacterial infections can mimic the features of haemorrhagic fever syndrome, and broad spectrum antibiotics, e.g. ceftriaxone, IV, 2 g daily, are indicated in every case until the diagnosis is confirmed.

DESCRIPTION

High fever, together with DIC and bleeding tendency. Other symptoms and organ involvement may be variable. Some important causes other than viral haemorrhagic fevers (VHF) are:

- bacterial septicaemia, particularly *N.meningitidis*
- severe tick bite fever
- severe falciparum malaria
- fulminant hepatitis
- leptospirosis
- other causes for DIC / bleeding tendency.



CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

Endemic causes of VHF in South Africa are Crimean-Congo fever and possibly Rift Valley Fever, both of which may be transmitted between humans by means of blood and body fluids.

REFERRAL

All suspected VHF cases need to be discussed and managed in consultation with the Regional Virologist or Infectious Diseases Consultant at the referral centre. Cases may also be discussed with the Special Pathogens Unit of the National Institute for Communicable Diseases:

Tel: 011 386 6000, Outbreak hotline: 082 883 9920.

Transfer of patients will only occur, once all relevant arrangements have been made to limit further exposure to a potentially contagious and life threatening agent.

DRUG TREATMENT INITIAL MANAGEMENT

A detailed travel and clinical history is crucial. If VHF is still considered, patient is to be isolated in a single room and proper precautions taken to limit further exposure. These include:

- long sleeved disposable gown
- vinyl or rubber apron if the patient is bleeding
- two pairs of latex gloves, one below the gown and one over the gown
- disposable face mask preferably with a visor
- goggles if a mask without the visor is used
- waterproof boots or 2 pairs of overshoes, one over the other

Alternate diseases (See above) should be excluded by means of appropriate laboratory testing, keeping safety precautions in mind.

Patients should be supported with packed red cells and fresh frozen plasma, as required.

Testing for VHF may be required, both to confirm and rule out the possibility of VHF - this is arranged with the NICD (See above), before sending the specimens, as specific precautions apply.

It is required to keep record and follow up all patient contacts.

9.5 HYDATID DISEASE

O01

DESCRIPTION

Cysts of *E. granulosus*, acquired from dogs in sheep-farming areas or from inadequately cooked mutton meat. Cysts may occur in any organ, but are most commonly found in the liver and lungs.

DRUG TREATMENT

- albendazole, oral, 15 mg/kg/day up to 400 mg twice daily for 28 days
Repeat cycle twice with 14 days break between courses.



CHAPTER 9 SYSTEMIC AND NOSOCOMIAL INFECTIONS

With medical therapy as above, cure is achieved in about a third, improvement in about a third and no response in about a third of cases.

Definitive treatment with surgery or PAIR (percutaneous aspiration injection and re-aspiration) is preferred for accessible lesions.

Before PAIR or surgery:

- albendazole, oral, 15 mg/kg/day up to 400 mg twice daily for 14–28 days

REFERRAL

- all cases to a centre with experience in surgery and PAIR

9.6 MALARIA, SEVERE

B53.8

*This is a notifiable disease.

See primary care book for uncomplicated malaria and non-falciparum malaria.

DESCRIPTION

P. falciparum malaria with one or more of the following features:

- impaired consciousness
- convulsions
- vomiting
- severe anaemia (Hb < 7 g/dL)
- haemoglobinuria
- deep jaundice
- renal dysfunction
- heavy parasitaemia ($\geq 5\%$)
- ARDS
- shock
- acidosis
- hypoglycaemia

NON-DRUG TREATMENT

Maintain hydration but avoid excessive fluid administration as this could contribute to the development of ARDS (especially in pregnancy).

Transfuse if haemoglobin < 6 g/dL.

There is no convincing evidence of benefit with the use of exchange transfusion.

DRUG TREATMENT

- quinine, IV
1 mL = 300 mg quinine salt
Loading dose: 20 mg/kg in dextrose 5% administered over 4 hours.
Maintenance dose: 8 hours after start of the loading dose, give 10 mg/kg in dextrose 5% over 4 hours repeated every 8 hours until there is clinical improvement and the patient can take oral therapy.

Complete the 7-day course with:

- quinine, oral, 600 mg 8 hourly
If the patient is experiencing side effects such as tinnitus and vertigo, reduce the dose to 600 mg 12 hourly.



CHAPTER 9 **SYSTEMIC AND NOSOCOMIAL INFECTIONS**

Monitor for hypoglycaemia and dysrhythmias.

Monitor treatment response with regular blood smears.

A dramatic reduction should appear after 48 hours.

An increase in parasitaemia may occur at 24 hours due to sequestration of parasites.

Note:

Gametocytes may appear after this stage – this does NOT mean failure of therapy.

Only the reappearance or failure to clear trophozoites means failure.

PLUS

To prevent the development of resistance:

- doxycycline, oral, 200 mg immediately, starting on day 3 of quinine treatment or as soon as able to take oral medication, and then 100 mg daily for 7 days

OR

In pregnancy, starting on day 3 of quinine treatment or as soon as able to take oral medication:

clindamycin, oral, 600 mg twice daily for 7 days starting on day 3 of quinine treatment

REFERRAL

- patient in need of ventilation or dialysis if these are unavailable on site

9.7 TETANUS

A35

*This is a notifiable disease.

NON-DRUG TREATMENT

Maintain airway.

Monitor ECG and blood pressure.

Maintain and replace IV fluids.

Wound management is essential with debridement and removal of any foreign bodies.

DRUG TREATMENT

For rigidity, spasms:

- diazepam, IV, 10 mg 4 hourly, for 24 hours, then consider oral route
Titrate to effect.
Doses as high as 50–100 mg 2 hourly are sometimes used.

Where muscle relaxation is required:

- alcuronium, IV, 10 mg/2 mL, as needed
This may exacerbate autonomic instability.

To eradicate bacteria:

- benzylpenicillin (Penicillin G), IV, 5 million units 6 hourly for 10 days
OR
metronidazole, oral, 400 mg 8 hourly for 10 days



CHAPTER 9 **SYSTEMIC AND NOSOCOMIAL INFECTIONS**

For passive immunisation:

- tetanus immunoglobulin, human, IM, 3 000 units as a single dose

For active immunisation of all patients as clinical tetanus does not always confer immunity:

- tetanus toxoid vaccine, IM, 0.5 mL, total of 3 doses:
 - on admission
 - at 4 weeks
 - at 6 months

For fever, combine with mechanical cooling:

- paracetamol, oral, 1 g 6 hourly

For shock, dehydration, maintenance of hydration:

- IV fluids, plasma volume expanders

As prophylaxis for deep vein thrombosis:

- heparin, SC, 5 000 units 8 hourly

To alleviate pain.

- morphine, slow IV, 10 mg up to 10 mL with sodium chloride 0.9% administered over 45 minutes
Repeat after 4–6 hours.

REFERRAL

- all cases to a facility with resources for artificial ventilation

9.8 TICK BITE FEVER

A79.9

DESCRIPTION

Tick-borne infection due to *R. conorii*, acquired from dogs, or *R. africae*, acquired from cattle and game. The hallmark of tick bite fever is the eschar, i.e. a round black lesion \pm 5 mm in diameter with an inflammatory halo, occurs in about two thirds of patients with *R. conorii* and in most cases of *R. africae* infection, where multiple eschars are common. A rash develops about the third day of illness in about two thirds of patients with *R. conorii* and in fewer cases of *R. africae* infection. In *R. conorii* infection the rash is maculopapular and involves the palms and soles. In *R. africae* infection the rash is sparse and may be vesicular.

DRUG TREATMENT

- doxycycline, oral, 100 mg 12 hourly for 7 days

In pregnancy:

- clindamycin, oral, 600 mg twice daily for 7 days
In severe cases, initiate therapy with 1–2 days of doxycycline.