

FExNet 2026

Collated SAQs: Dermatology and Infectious Diseases

ANSWER BOOKLET

Model answers for the 22 dermatology and infectious diseases SAQs. References cited at the foot of each question. Items marked [core] are required for full marks. Drug doses confirmed with current eTG Therapeutic Guidelines (Antibiotic and Dermatology), ASHM PEP Guidelines, Surviving Sepsis Campaign 2021, and Australian national infectious disease guidelines.

22 questions • 234 marks

ACEM-aligned format. Sub-questions labelled a) b) c). Mark allocations indicative; references cited in the Answer Booklet. Question and answer indexes are clickable.

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Click any entry to jump to its answer. Marks shown right.

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Question 1 | Cellulitis and Its Mimics (11 marks)

A 55-year-old woman presents to your emergency department with a 3-day history of progressive redness, warmth, swelling, and tenderness of her right lower leg. She has a background of chronic venous insufficiency and was discharged from hospital 1 week ago after coronary artery bypass grafting (saphenous vein harvest from the right leg). Her vital signs: heart rate 95 beats per minute, blood pressure 130/80 millimetres of mercury, respiratory rate 18 breaths per minute, temperature 37.6 degrees Celsius.

a) List 5 non-infectious conditions that mimic unilateral leg cellulitis AND state a differentiating feature for each. (5 marks)

- **Deep vein thrombosis:** differentiating feature — calf tenderness, raised D-dimer, positive duplex ultrasound; Wells DVT score elevated; risk factors (recent surgery — this case) **[core]**
- **Stasis dermatitis (chronic venous eczema):** bilateral, chronic, associated with venous changes (haemosiderin, atrophie blanche, varicose veins); typically not warm **[core]**
- **Lymphoedema (chronic / lipodermatosclerosis):** non-pitting, woody texture; bilateral common; positive Stemmer's sign (cannot pinch up skin at base of second toe) **[core]**
- **Acute gout** (especially of ankle / lower leg): rapid onset, severe pain, joint involvement; raised serum urate; synovial fluid analysis shows negatively birefringent crystals **[core]**
- **Erythema migrans (Lyme disease):** bullseye / target appearance; history of tick bite; geographic risk factor **[core]**
- **Drug-induced inflammatory reaction** (e.g. calcium channel blocker peripheral oedema with skin reaction)
- **Contact dermatitis:** itchy rather than painful; geometric / linear pattern; recent exposure to allergen
- **Cutaneous T-cell lymphoma / mycosis fungoides**
- **Pyoderma gangrenosum:** violaceous undermined border; associated with inflammatory bowel disease, rheumatoid arthritis

b) List 3 oral antibiotic options for cellulitis covering *Streptococcus pyogenes* AND *Staphylococcus aureus* (MSSA). (3 marks)

- **Cephalexin 500 mg orally 4 times daily** (or 1 g orally 3 times daily) — first-line per eTG **[core]**
- **Flucloxacillin 500 mg orally 4 times daily** — covers MSSA and *Streptococcus* **[core]**
- **Dicloxacillin 500 mg orally 4 times daily** **[core]**
- **Clindamycin 450 mg orally 3 times daily** — for penicillin allergy (covers MSSA, *Streptococcus*, and toxin production)
- **Amoxicillin-clavulanate 875/125 mg orally twice daily** — broader cover including some gram-negative if polymicrobial concern
- **Doxycycline 100 mg orally twice daily** — alternative in non-severe cellulitis with concern for MRSA cover

c) List 3 indications for IV antibiotics over oral. (3 marks)

- **Systemic features of sepsis** — fever, tachycardia, hypotension, tachypnoea, lactate >2 **[core]**
- **Rapidly progressive cellulitis** (within hours) or extensive area; facial cellulitis; multiple sites **[core]**
- **Failure of oral therapy** after 48-72 hours; complications (lymphangitis, lymphadenitis, abscess, septic arthritis) **[core]**
- Immunocompromise (diabetes mellitus, neutropenia, post-transplant)
- Inability to tolerate oral medication (vomiting)
- Concern for necrotising fasciitis or other deep-space infection

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 250

Question 2 | Necrotising Fasciitis (13 marks)

A 65-year-old man with type 2 diabetes mellitus presents to your emergency department with severe pain in his left lower leg following a minor garden injury 3 days ago. The pain is disproportionate to the visible skin findings. On examination, the leg has dusky, tense skin with a small area of central erythema spreading rapidly. There are bullae and crepitus on palpation. He is haemodynamically unstable: heart rate 130 beats per minute, blood pressure 80/50 millimetres of mercury, respiratory rate 28 breaths per minute, peripheral oxygen saturation 96 percent on room air, temperature 38.8 degrees Celsius. White cell count 18, C-reactive protein 280, glucose 18, lactate 5, sodium 132, creatinine 180.

a) List 6 features (history / examination / investigation) supporting necrotising fasciitis. (6 marks)

- **Pain disproportionate to visible findings** (key feature; precedes skin changes) **[core]**
- **Dusky / cyanotic / mottled skin with rapid progression (over hours)**; necrotic patches **[core]**
- **Crepitus, bullae, or skin necrosis** **[core]**
- **Systemic toxicity** — sepsis, shock, multi-organ involvement (high lactate, AKI, lactic acidosis) **[core]**
- **LRINEC score ≥ 6** (Laboratory Risk Indicator for Necrotising Fasciitis): uses CRP >150 , WCC >15 , Hb <135 , Na <135 , creatinine >141 , glucose >10 **[core]**
- **Imaging features**: subcutaneous gas on plain film or computed tomography; fascial thickening on MRI **[core]**
- Risk factors: diabetes, peripheral vascular disease, obesity, alcohol use, recent surgery, intravenous drug use, immunocompromise
- Failure to respond to initial antibiotic therapy

b) State 4 immediate management priorities. (4 marks)

- **Urgent surgical consultation for operative debridement** — definitive treatment; survival depends on prompt and aggressive surgical removal of all necrotic tissue (within hours of diagnosis); often requires multiple operations **[core]**
- **Empirical broad-spectrum intravenous antibiotics** — meropenem 1 g IV every 8 hours + vancomycin 25 mg/kg loading then 15-20 mg/kg every 12 hours + clindamycin 600 mg IV every 8 hours (toxin suppression for Group A streptococcus) **[core]**
- **Aggressive resuscitation** per Surviving Sepsis Campaign — fluid bolus 30 mL/kg crystalloid; vasopressor support; transfusion for anaemia / coagulopathy **[core]**
- **Intensive care unit admission** with ongoing monitoring; blood cultures BEFORE antibiotics (without delaying); tetanus update; analgesia **[core]**
- Consider intravenous immunoglobulin 1-2 g/kg for severe Group A streptococcus / staphylococcal toxic shock (limited evidence)
- Hyperbaric oxygen therapy in selected cases — specialist input
- Surgical / orthopaedic / plastic / vascular team discussion regarding amputation if extensive limb involvement

c) List 3 microbial causes / classifications of necrotising fasciitis. (3 marks)

- **Type I (polymicrobial)** — mixed aerobic + anaerobic flora; typically older patients with comorbidities (diabetes, peripheral vascular disease); enteric flora (Bacteroides, E. coli, enterococcus, anaerobes); Fournier's gangrene is type I **[core]**
- **Type II (monomicrobial)** — Streptococcus pyogenes (Group A streptococcus) $\pm$ Staphylococcus aureus; younger, fitter patients; rapid progression; often associated with toxic shock **[core]**

- **Type III (gas gangrene / clostridial)** — *Clostridium perfringens*; usually post-traumatic with deep wound contamination **[core]**
- Type IV (fungal) — rare; immunocompromised; *Candida*, *Mucor*
- *Vibrio vulnificus* — seafood / saltwater exposure; rapidly fatal if not treated

References: *eTG Therapeutic Guidelines — Antibiotic* • *eTG (Therapeutic Guidelines, current)* • *CDC / IDSA Skin and Soft Tissue Infection Guidelines* • *ACEM clinical policies and statements* • *Tintinalli's Emergency Medicine 9e Ch 250*

Question 3 | Fournier's Gangrene (11 marks)

A 48-year-old man (weight 100 kilograms) with type 2 diabetes mellitus presents to your emergency department with severe perineal pain and rapidly spreading erythema of the scrotum and perineum for 24 hours. He has had several small skin tags and a minor anal fistula for years. On examination, the scrotum and perineum are dusky, with crepitus on palpation and an unpleasant odour. The skin is necrotic over a 5-centimetre area on the right scrotum. Vital signs: Glasgow Coma Score 14, heart rate 120 beats per minute, blood pressure 90/45 millimetres of mercury, peripheral oxygen saturation 99 percent on room air, temperature 39.5 degrees Celsius.

a) List 3 risk factors for Fournier's gangrene. (3 marks)

- **Diabetes mellitus** (most common — approximately 60 percent of cases) [core]
- **Local trauma or recent surgery** (perianal abscess, fistula, urethral instrumentation, surgery) [core]
- **Immunocompromise** (HIV, chemotherapy, alcohol use disorder, morbid obesity) [core]
- Male sex (10:1 ratio)
- Genitourinary or colorectal infection / instrumentation
- Chronic skin conditions, poor hygiene

b) State 5 management priorities. (5 marks)

- **Urgent surgical consultation** (general surgical / urological / colorectal) for operative debridement — definitive treatment; multiple operations often needed; survival depends on prompt wide excision [core]
- **Empirical broad-spectrum intravenous antibiotics — meropenem 1 g IV every 8 hours + clindamycin 600 mg IV every 8 hours** (per eTG); covers polymicrobial gram-negative, gram-positive, and anaerobes; toxin suppression [core]
- **Aggressive resuscitation** per Surviving Sepsis Campaign — fluid bolus 30 mL/kg crystalloid; noradrenaline if persistent hypotension; transfusion as needed [core]
- **Diabetes management** — insulin infusion (correct hyperglycaemia); treat ketoacidosis if present [core]
- **ICU admission**; blood cultures before antibiotics; tetanus update; consider colostomy formation to divert faecal stream away from perineum [core]
- Hyperbaric oxygen therapy may be adjunctive in specialist centres
- Anti-toxin therapy — clindamycin (toxin suppression); intravenous immunoglobulin considered for streptococcal toxic shock

c) List 3 likely causative organisms. (3 marks)

- **Polymicrobial** (typical of Fournier's — Type I necrotising fasciitis): **E. coli**, **Klebsiella** and other Enterobacteriaceae [core]
- **Bacteroides fragilis** and other anaerobes [core]
- **Streptococcus pyogenes** (Group A streptococcus) and **Staphylococcus aureus** [core]
- Enterococcus species
- Clostridium perfringens (gas gangrene component)
- Mixed aerobic / anaerobic flora is typical

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 250

Question 4 | Stevens-Johnson Syndrome / Toxic Epidermal Necrolysis (12 marks)

A 34-year-old man presents to your emergency department with a 3-day history of widespread blistering rash and mucositis. The rash started on his face and trunk and has rapidly spread. He started a course of trimethoprim-sulfamethoxazole for a urinary tract infection 1 week ago. On examination, he has confluent erythematous and purpuric macules with central blistering covering approximately 25 percent of his body surface area. There is severe oral mucositis with sloughing, conjunctival injection with purulent discharge, and genital erosions. The Nikolsky sign is positive.

a) Define Stevens-Johnson syndrome and toxic epidermal necrolysis AND state the classification by body surface area. (3 marks)

- **SJS / TEN spectrum** — severe mucocutaneous reactions characterised by epidermal detachment and mucosal involvement; mortality 5 percent for SJS, up to 30 percent for TEN **[core]**
- **SJS**: less than 10 percent body surface area epidermal detachment **[core]**
- **SJS-TEN overlap**: 10-30 percent body surface area; **TEN**: greater than 30 percent body surface area (this patient is SJS-TEN overlap at 25 percent) **[core]**
- Nikolsky sign — gentle lateral pressure on intact skin causes blistering / detachment (positive in SJS/TEN)
- Asboe-Hansen sign — gentle pressure on bullae causes lateral extension

b) List 4 likely causes (medications and infections). (4 marks)

- **Sulfonamides** — sulfamethoxazole (this case), sulfasalazine, dapsone **[core]**
- **Anticonvulsants** — phenytoin, carbamazepine, lamotrigine, valproate **[core]**
- **Allopurinol** (especially with HLA-B*5801 — high in Asian populations); **NSAIDs** (oxicams, especially piroxicam) **[core]**
- **Antibiotics** — beta-lactams, fluoroquinolones, macrolides; **antiretrovirals** (nevirapine, abacavir) **[core]**
- Infections — Mycoplasma pneumoniae (especially in children — 'Mycoplasma-induced rash and mucositis'), herpes simplex, HIV
- Other — gout management drugs, allopurinol (genetic predisposition with HLA-B*5801)

c) State 5 management priorities. (5 marks)

- **STOP all suspected medications** — especially recent (within 1-3 weeks); this is the most important intervention; this patient should stop trimethoprim-sulfamethoxazole **[core]**
- **Transfer to burns unit / intensive care unit** — fluid management as for extensive burns (Parkland formula 2-4 mL/kg/percent BSA over 24 hours), temperature regulation, wound care **[core]**
- **Specialist multidisciplinary care** — ophthalmology (severe ocular complications including blindness; lubrication, sterile contact lenses), ENT, urology / gynaecology (mucosal involvement), dermatology, plastic surgery **[core]**
- **Supportive treatment** — intravenous fluid resuscitation, analgesia, anti-emetics, nutrition support (nasogastric or parenteral); antibiotic prophylaxis for skin infection (NOT routine; treat infection if it develops) **[core]**
- **Specific therapies (controversial)** — intravenous immunoglobulin 1-3 g/kg (evidence mixed); cyclosporine 3-5 mg/kg/day; corticosteroids (controversial — may worsen sepsis); do not use without specialist input **[core]**
- SCORTEN scoring (severity-of-illness for TEN) predicts mortality
- Document carefully — risk factor for life with DRESS-like reactions; Medic-Alert and avoidance of triggering drug class

References: eTG (Therapeutic Guidelines, current) • eTG Therapeutic Guidelines — Dermatology • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 247

Question 5 | Eczema Herpeticum (9 marks)

An 18-month-old boy is brought to your emergency department by his parents with a worsening rash on his face for 3 days. He has a background history of severe atopic dermatitis (eczema). His vital signs: heart rate 130 beats per minute, central capillary refill less than 2 seconds, temperature 38.8 degrees Celsius. He is fully immunised and atopic. The face has multiple discrete and clustered vesicles overlying erythematous skin, with crusting and umbilicated lesions. Some lesions are punched-out and erosive.

a) List 3 features describing the rash that support the diagnosis. (3 marks)

- **Punched-out / monomorphic vesicular lesions** with central umbilication (pathognomonic of herpes simplex infection) **[core]**
- **Clustered or grouped distribution** with overlying eczematous skin (atopic dermatitis allows herpes simplex virus to spread) **[core]**
- **Erosive / weeping lesions with crusting**; bleeding on disruption **[core]**
- Lesions of similar age (synchronous) within an outbreak — distinguishes from chickenpox
- Pruritus and burning sensation; constitutional symptoms (fever, malaise)

b) List 3 differential diagnoses. (3 marks)

- **Impetigo / impetiginised eczema** (staphylococcal / streptococcal superinfection) **[core]**
- **Varicella zoster (chickenpox)** — lesions of varying ages (cropping) **[core]**
- **Atopic dermatitis flare** (non-infected) — pruritic but no vesicles **[core]**
- Hand-foot-mouth disease (Coxsackie) — characteristic distribution
- Disseminated herpes zoster (rare in young children)
- Erythema multiforme (target lesions, no vesicles predominantly)
- Allergic contact dermatitis

c) State 3 management priorities. (3 marks)

- **Aciclovir 10-20 mg/kg intravenous every 8 hours for 5-7 days** (switch to oral once improving — valaciclovir or oral aciclovir); EARLY treatment is critical to prevent complications **[core]**
- **Hospital admission** for monitoring; isolation precautions; fluid management; treat secondary bacterial infection (cefazolin or flucloxacillin); pain control **[core]**
- **Ophthalmology consultation if eyelid / periocular involvement** (risk of herpetic keratitis and blindness); monitor for systemic dissemination (hepatitis, encephalitis) **[core]**
- Continue eczema treatment but AVOID topical corticosteroids on infected areas
- Educate parents — caution with future herpes exposures (cold sores)

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Royal Children's Hospital Melbourne CPG

Question 6 | Kawasaki Disease (11 marks)

A 2-year-old girl is brought to your emergency department by her parents with a rash and fever. She has been unwell with daily fever above 39 degrees Celsius for 5 days. She had been seen by her general practitioner 2 days ago and started on oral antibiotics for presumed viral illness. Examination today: temperature 39.5 degrees Celsius, heart rate 160 beats per minute, respiratory rate 32 breaths per minute, peripheral oxygen saturation 98 percent on room air. She has a polymorphous rash on the trunk, conjunctival injection without exudate, strawberry tongue, fissured lips, palmar erythema with peeling, and right cervical lymphadenopathy (1.6 centimetre node).

a) List the 5 principal diagnostic criteria for Kawasaki disease. (5 marks)

- **Fever ≥ 5 days** (mandatory) [core]
- **Bilateral non-suppurative conjunctivitis** (without exudate) [core]
- **Polymorphous (variable) exanthem** (not vesicular or bullous) [core]
- **Mucous membrane changes** — strawberry tongue, fissured lips, erythema of pharynx [core]
- **Extremity changes** — palmar / plantar erythema and oedema (acute), periungual desquamation (subacute) [core]
- **Cervical lymphadenopathy** — typically unilateral, >1.5 cm; least frequent feature [core]
- Diagnosis requires fever ≥ 5 days PLUS at least 4 of the other 5 features (or 3 with confirmed coronary artery aneurysm)
- Incomplete (atypical) Kawasaki disease — meets fewer criteria; consider in any prolonged fever in young children with consistent features

b) Name the principal serious complication AND state 2 investigations to monitor for it. (3 marks)

- **Coronary artery aneurysm and thrombosis** — develops in 25 percent untreated; reduced to 4-5 percent with treatment; can lead to myocardial infarction in childhood / adolescence [core]
- **Echocardiography** — at diagnosis, 1-2 weeks, and 4-8 weeks; assesses coronary artery calibre, ejection fraction, valvular regurgitation [core]
- **12-lead electrocardiogram** — ischaemic changes, conduction abnormalities; B-type natriuretic peptide / troponin if myocardial involvement suspected [core]
- Other complications: myocarditis, pericarditis, valvular dysfunction, congestive heart failure, arrhythmias
- Long-term: persistent coronary aneurysms can rupture or thrombose

c) State 3 management priorities. (3 marks)

- **Intravenous immunoglobulin 2 g/kg as single infusion over 10-12 hours** — ideally given within first 10 days of fever; reduces coronary aneurysm risk from 25 to 4-5 percent [core]
- **Aspirin 30-50 mg/kg/day in 4 divided doses** (high-dose anti-inflammatory) while febrile; reduce to 3-5 mg/kg/day (antiplatelet) for 6-8 weeks (or longer with coronary involvement) [core]
- **Paediatric / paediatric cardiology consultation** for ongoing care; echocardiogram; long-term cardiology follow-up [core]
- Second IVIG dose if persistent fever after 36 hours; consider corticosteroids or anti-TNF (infliximab) for refractory cases

References: eTG Therapeutic Guidelines — Dermatology • eTG (Therapeutic Guidelines, current) • Royal Children's Hospital Melbourne CPG • Tintinalli's Emergency Medicine 9e Ch 109

Question 7 | Erysipelas — Facial Cellulitis (9 marks)

A 70-year-old man presents to your emergency department with a 24-hour history of a rapidly expanding red rash on his right cheek. He has had a recent dental abscess. On examination, there is a sharply demarcated, raised, intensely red, hot, tender area on the right cheek with a clear advancing border. He is febrile (38.6 degrees Celsius), heart rate 100 beats per minute. There is significant peri-auricular swelling but no deep neck involvement (no trismus, no airway compromise).

a) List 3 features distinguishing erysipelas from cellulitis. (3 marks)

- **Sharply demarcated, raised borders** with abrupt transition from involved to uninvolved skin (cellulitis has more diffuse / gradual borders) **[core]**
- **Superficial dermis / upper subcutis** (vs deeper subcutaneous involvement in cellulitis); often shiny, intensely red ('peau d'orange') **[core]**
- **Causative organism is almost always Group A streptococcus** (*Streptococcus pyogenes*) — vs polymicrobial in cellulitis **[core]**
- Often involves face (particularly butterfly distribution) or lower legs
- More acute / rapidly progressive than cellulitis; lymphangitic streaking common

b) State the empirical antibiotic regimen AND duration. (3 marks)

- **First-line: phenoxymethylpenicillin (penicillin V) 500 mg orally every 6 hours** for non-severe; OR **benzylpenicillin 1.2-2.4 g IV every 4-6 hours** for severe / facial involvement (per eTG) **[core]**
- **If MSSA suspected:** cephalexin 500 mg orally 4 times daily OR flucloxacillin 500 mg orally 4 times daily **[core]**
- **Penicillin allergy:** clindamycin 450 mg orally 3 times daily; alternative azithromycin 500 mg orally daily for 5 days; **duration: 5-10 days for non-severe; 10-14 days for severe** **[core]**
- Recurrence is common — consider long-term prophylaxis (penicillin V 250-500 mg orally daily) for >3 episodes per year

c) List 3 specific concerns regarding facial erysipelas. (3 marks)

- **Cavernous sinus thrombosis** — extension via valveless venous drainage from face to cavernous sinus (especially central face involvement) **[core]**
- **Orbital cellulitis** — peri-orbital involvement; consult ophthalmology if any concern **[core]**
- **Source identification** — dental infection (this case), sinusitis, otitis media, skin breach; needs specific treatment **[core]**
- Glomerulonephritis (post-streptococcal); rheumatic fever (less common adult)
- Treatment failure or progression to necrotising fasciitis

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 250

Question 8 | Diabetic Foot Infection (11 marks)

A 65-year-old man with type 2 diabetes mellitus (HbA1c 9.5 percent), peripheral vascular disease, and chronic kidney disease (estimated glomerular filtration rate 35 mL/min) presents to your emergency department with a 1-week history of an ulcer on the plantar surface of his right great toe. He has been mobilising on it. On examination, the ulcer is 2 by 1 centimetres, with surrounding erythema and warmth extending 5 centimetres proximally. There is malodorous discharge. The ulcer probes to bone with a metal probe. Vital signs: heart rate 105, blood pressure 130/80, temperature 37.8 degrees Celsius.

a) List 4 features supporting moderate-to-severe diabetic foot infection (per IDSA / IWGDF classification). (4 marks)

- **Cellulitis >2 cm beyond ulcer margin** (this case — 5 cm) **[core]**
- **Probe-to-bone test positive** (strongly suggests osteomyelitis) **[core]**
- **Systemic features** — fever, tachycardia, raised inflammatory markers, lactate; significant comorbidity (peripheral vascular disease) **[core]**
- **Tissue / bone necrosis, ascending infection**, abscess, gangrene **[core]**
- Comorbid conditions limiting wound healing — uncontrolled diabetes, peripheral vascular disease, chronic kidney disease, immune suppression

b) State 4 management priorities. (4 marks)

- **Empirical broad-spectrum intravenous antibiotics** — piperacillin-tazobactam 4.5 g IV every 8 hours (per eTG; covers gram-positive, gram-negative, and anaerobes); add vancomycin if MRSA risk **[core]**
- **Surgical / vascular consultation** for debridement and possible revascularisation; assess perfusion (ankle-brachial index, toe-brachial index, Doppler ultrasound, computed tomography angiography) **[core]**
- **Imaging** — plain radiograph (bone destruction, soft tissue gas); magnetic resonance imaging foot for osteomyelitis (gold standard); deep tissue and bone cultures **[core]**
- **Off-loading / non-weight-bearing**; wound care; glycaemic control (insulin); admit to hospital for IV antibiotics **[core]**
- Duration of antibiotics: 1-2 weeks for soft tissue; 4-6 weeks for osteomyelitis (typically 6+ weeks IV then orals)
- Multi-disciplinary team — endocrinology, vascular, podiatry, infectious diseases

c) List 3 likely causative organisms. (3 marks)

- **Staphylococcus aureus** (including MRSA — high-risk in diabetes mellitus; test for nasal colonisation) **[core]**
- **Streptococcus species** (Group A, B, C, G; Streptococcus anginosus group) **[core]**
- **Gram-negative organisms** — Pseudomonas aeruginosa (especially in chronic ulcers, post-bath); E. coli, Proteus, Klebsiella **[core]**
- **Anaerobes** — Bacteroides, Peptostreptococcus, Prevotella (especially in deep / chronic wounds, foul-smelling discharge)
- Polymicrobial in 60-80 percent of chronic / moderate-severe diabetic foot infections

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • IDSA / IWGDF Diabetic Foot Guidelines • Tintinalli's Emergency Medicine 9e Ch 250

Question 9 | Hand Infection — Flexor Tenosynovitis (10 marks)

A 14-year-old boy with type 1 diabetes mellitus presents to your emergency department with a painful right hand. He sustained a puncture injury to the flexor surface of his right index finger 2 days ago while climbing a tree. On examination, his right index finger is held in slight flexion, with diffuse swelling along the volar aspect of the finger and into the palm. Passive extension of the finger causes severe pain. Vital signs: heart rate 105, blood pressure 110/70, temperature 38.5 degrees Celsius.

a) Describe Kanavel's signs of flexor tenosynovitis (4 signs). (4 marks)

- **Tenderness along the entire flexor tendon sheath** (extending into the palm) **[core]**
- **Symmetric / fusiform swelling** of the affected finger ('sausage finger') **[core]**
- **Finger held in flexed position at rest** (semi-flexed — most comfortable position) **[core]**
- **Severe pain on passive extension** of the finger (most specific finding) **[core]**

b) List 3 investigations with rationale. (3 marks)

- **Plain radiograph of hand** — exclude retained foreign body, fracture, subcutaneous gas (suggesting infection) **[core]**
- **Ultrasound** — fluid in tendon sheath, abscess; can guide aspiration diagnosis **[core]**
- **Magnetic resonance imaging hand** — definitive for soft tissue and tendon involvement; identifies abscess; rarely needed acutely **[core]**
- Blood tests — full blood count, C-reactive protein, blood glucose / HbA1c (uncontrolled diabetes), tetanus status
- Tissue / wound culture if material available

c) State 3 management priorities. (3 marks)

- **Urgent hand / orthopaedic surgical consultation** for incision and drainage with sheath irrigation; delay risks irreversible tendon damage and stiffness **[core]**
- **Empirical intravenous antibiotics** — **flucloxacillin 2 g IV every 6 hours** (or vancomycin if MRSA suspected); add gram-negative cover (piperacillin-tazobactam) if diabetic or contaminated wound **[core]**
- **Analgesia, splinting in safe position** (slight flexion of MCP, extension of IP joints), elevation; tetanus update **[core]**
- Glycaemic control — insulin
- Nil by mouth pending operative theatre; anaesthetic review
- Consider underlying immunocompromise / risk factors

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 268

Question 10 | Community-Acquired Pneumonia (12 marks)

A 65-year-old woman presents to your emergency department with a 3-day history of productive cough, pleuritic chest pain, and progressive dyspnoea. Her past medical history includes chronic obstructive pulmonary disease (treated with tiotropium) and ischaemic heart disease. On arrival her vital signs are: respiratory rate 28 breaths per minute, peripheral oxygen saturation 89 percent on room air rising to 93 percent on 4 litres oxygen, heart rate 110 beats per minute, blood pressure 100/55 millimetres of mercury, temperature 38.8 degrees Celsius, blood glucose 5.6 millimoles per litre. Her chest radiograph shows a right lower lobe consolidation. White cell count 22, urea 12 mmol/L.

a) Calculate the CURB-65 score for this patient (state each component). (5 marks)

- **C — Confusion:** NO (patient is alert) → **0 [core]**
- **U — Urea >7 mmol/L:** YES (urea 12) → **1 [core]**
- **R — Respiratory rate ≥ 30 / min:** NO (RR 28) → **0 [core]**
- **B — Blood pressure (systolic <90 OR diastolic ≤ 60):** YES (BP 100/55, diastolic 55) → **1 [core]**
- **65 — Age ≥ 65 :** YES → **1. TOTAL CURB-65 = 3** (severe; 30-day mortality 14-22 percent; consider ICU admission) **[core]**

b) State the empirical antibiotic regimen for this severity of community-acquired pneumonia AND state 4 most likely pathogens. (4 marks)

- **For severe community-acquired pneumonia (CURB-65 ≥ 3):** ceftriaxone 1-2 g IV daily + azithromycin 500 mg IV daily (per eTG); covers *Streptococcus pneumoniae* and atypicals **[core]**
- **Pathogens:** *Streptococcus pneumoniae* — most common (50-60 percent) **[core]**
- *Mycoplasma pneumoniae*, *Chlamydia pneumoniae* (atypicals; particularly in younger patients) **[core]**
- *Haemophilus influenzae* (particularly in COPD) **[core]**
- *Legionella pneumophila* (atypical; consider if multi-organ involvement, low sodium)
- *Staphylococcus aureus* (post-influenza)
- *Moraxella catarrhalis*
- *Pseudomonas aeruginosa* (in severe COPD, structural lung disease, recent hospitalisation)

c) List 3 management priorities beyond antibiotics. (3 marks)

- **Oxygen therapy** — target SpO_2 88-92 percent in COPD (avoid hyperoxia); titrate to lowest FiO_2 needed **[core]**
- **Fluid resuscitation** if shocked (target MAP >65, urine output >0.5 mL/kg/h); cautious in COPD with co-existing cardiac disease **[core]**
- **Investigations** — blood cultures, urinary antigen tests (*Streptococcus pneumoniae* and *Legionella*), respiratory viral PCR, sputum culture, lactate, ABG; HIV test if not previously done **[core]**
- Non-invasive ventilation (BiPAP) if hypercapnic respiratory failure (COPD context)
- Senior medical / intensive care input given CURB-65 score

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 65

Question 11 | Pneumocystis Pneumonia in HIV (11 marks)

A 45-year-old man known to be HIV-positive (last CD4 count 60 cells/mm³ a year ago, on anti-retroviral therapy with poor compliance) presents to your emergency department with a 2-week history of progressive shortness of breath, dry non-productive cough, and 8-kilogram weight loss. His vital signs: heart rate 105 beats per minute, blood pressure 110/70 millimetres of mercury, respiratory rate 30 breaths per minute, peripheral oxygen saturation 92 percent on room air falling to 86 percent on minimal exertion, temperature 38.6 degrees Celsius. Chest examination: bilateral fine crackles. Chest radiograph shows bilateral interstitial infiltrates with peri-hilar predominance.

a) List 4 differential diagnoses to consider in this patient. (4 marks)

- **Pneumocystis jirovecii pneumonia (PCP / PJP)** — most likely; CD4 <200; characteristic gradual onset, dry cough, exertional desaturation [core]
- **Tuberculosis** (pulmonary or extrapulmonary) — common in immunocompromised; consider in any HIV patient [core]
- **Bacterial pneumonia** — Streptococcus pneumoniae most common; also Haemophilus, Pseudomonas [core]
- **Cryptococcal infection** — particularly with neurological symptoms; Cryptococcus neoformans pulmonary involvement [core]
- **Cytomegalovirus pneumonitis** — particularly with retinitis or other organ involvement
- **Kaposi's sarcoma** with pulmonary involvement
- **Viral pneumonia** (SARS-CoV-2, influenza, respiratory syncytial virus)
- **Atypical mycobacterial infection** (Mycobacterium avium complex)

b) List 4 specific investigations with rationale. (4 marks)

- **Sputum induction or bronchoalveolar lavage** for direct fluorescence antibody / silver stain for Pneumocystis (cysts and trophozoites) [core]
- **Lactate dehydrogenase** — markedly elevated in PCP (sensitive but not specific); >500 supports diagnosis [core]
- **Computed tomography of chest with contrast** — characteristic ground-glass opacity, pneumatoceles; rules out other pathology [core]
- **HIV viral load and CD4 count** — essential for prognosis and treatment decisions; PCP develops typically CD4 <200 [core]
- Blood cultures, urinary Streptococcus pneumoniae and Legionella antigens
- Tuberculin skin test or interferon-gamma release assay (latent TB); 3 sputum samples for AFB
- Serum cryptococcal antigen, 1,3-beta-D-glucan (PCP marker)

c) State 3 immediate management priorities for PCP with hypoxia. (3 marks)

- **Trimethoprim-sulfamethoxazole (co-trimoxazole) intravenous** — **15-20 mg/kg/day of trimethoprim component, divided every 6-8 hours** for 21 days (per eTG); first-line [core]
- **Adjunctive prednisolone for severe PCP** (PaO₂ <70 mmHg or A-a gradient >35 on room air): 40 mg orally twice daily for 5 days, then 20 mg twice daily for 5 days, then 20 mg daily for 11 days [core]
- **Oxygen support** and senior medical / infectious diseases consultation; alternative anti-PCP agents if co-trimoxazole intolerant (clindamycin + primaquine, atovaquone) [core]
- Continue ART (resume if non-compliant); avoid starting ART before PCP improves to prevent Immune Reconstitution Inflammatory Syndrome
- Pneumocystis prophylaxis (co-trimoxazole 160/800 mg orally daily) post-treatment until CD4 >200 for 3-6 months

References: *eTG Therapeutic Guidelines — Antibiotic* • *eTG (Therapeutic Guidelines, current)* • *ASHM (Australasian Society for HIV Medicine) PEP Guidelines* • *Australian HIV Guidelines*

Question 12 | HIV Post-Exposure Prophylaxis (Sexual Exposure) (11 marks)

A 22-year-old HIV-negative man presents to your urban emergency department at 2 am with a history of unprotected receptive anal intercourse with an anonymous male partner the previous evening (approximately 8 hours ago). He is asymptomatic and requests post-exposure prophylaxis (PEP). His last HIV test was 6 months ago (negative).

a) List 4 factors influencing the decision to commence HIV PEP. (4 marks)

- **Source HIV status** — known HIV-positive (especially with detectable viral load) versus unknown / anonymous (this patient — high-risk Australian context) **[core]**
- **Type of exposure** — receptive anal intercourse highest risk (1 in 70-300); needle-stick low risk (1 in 300-1000); splash exposure very low risk **[core]**
- **Time since exposure** — most effective <72 hours; some efficacy up to 7 days; this patient at 8 hours is well within window **[core]**
- **Source population HIV prevalence** — high in MSM in some urban areas; high in injecting drug users; HIV endemic countries **[core]**
- Source viral load (high VL = more transmissible)
- Concurrent risk factors — STIs, mucosal abrasion, ulcer disease, menstruation

b) State 4 important components of discharge advice (PEP regimen). (4 marks)

- **Tenofovir disoproxil 245 mg + emtricitabine 200 mg orally daily + dolutegravir 50 mg orally daily for 28 days** (per ASHM PEP guidelines; Truvada-DTG triple therapy is current standard for high-risk exposures) **[core]**
- **Side effects to expect** — nausea, headache, fatigue (mild and transient); rash; renal monitoring (creatinine at baseline and 2 weeks); seek review if vomiting, jaundice **[core]**
- **Strict adherence essential** — missed doses reduce efficacy; interactions with antacids, dairy, PPIs, anticoagulants; review current medications **[core]**
- **Repeat HIV testing** — at baseline, 6 weeks, 3 months (and 6 months if high-risk); seroconversion may occur despite PEP **[core]**
- Avoid further high-risk exposure; condom use; consider PrEP (pre-exposure prophylaxis) for ongoing risk
- Sexual contact partner notification and consider STI screening / treatment (syphilis, gonorrhoea, chlamydia, trichomonas)
- Hepatitis B vaccination (if not already vaccinated; serology); hepatitis C screening; HIV testing for partner

c) List 3 other considerations / co-treatments. (3 marks)

- **Hepatitis B post-exposure** — vaccine ± hepatitis B immunoglobulin (125-200 IU/kg IM) depending on vaccination status and HBV status of source **[core]**
- **STI prophylaxis** — empirical ceftriaxone 500 mg IM + azithromycin 1 g PO + doxycycline 100 mg PO BD (per STI guidelines); doxy-PEP within 72 h for syphilis prevention (200 mg PO single dose post-exposure) **[core]**
- **Mental health / counselling support** — sexual assault hotline; sexual health service; ongoing anxiety re HIV seroconversion **[core]**
- Documentation of consent and counselling; follow-up arranged with sexual health clinic
- Inform of PrEP availability for ongoing risk

References: ASHM (Australasian Society for HIV Medicine) PEP Guidelines • eTG (Therapeutic Guidelines, current) • Australian STI Management Guidelines • ACEM clinical policies and statements

Question 13 | AIDS-Defining Illnesses (9 marks)

A 45-year-old man with known HIV (last CD4 count 180 cells/mm³, on antiretroviral therapy) presents to your emergency department with shortness of breath. You are concerned he has an AIDS-defining illness.

a) State the 2 laboratory criteria for AIDS. (2 marks)

- **CD4 T-lymphocyte count <200 cells/mm³** in an HIV-infected individual **[core]**
- **OR presence of an AIDS-defining illness** in an HIV-infected individual (regardless of CD4 count) **[core]**
- CD4 <14 percent of total lymphocytes (alternative criterion)

b) List 4 AIDS-defining illnesses. (4 marks)

- **Pneumocystis jirovecii pneumonia** **[core]**
- **Cytomegalovirus disease** (retinitis, oesophagitis, colitis) **[core]**
- **Cryptococcal infection** (meningitis, pneumonia, disseminated) **[core]**
- **Toxoplasma encephalitis** **[core]**
- **Disseminated mycobacterial infection** (MAC, Mycobacterium avium complex)
- **Tuberculosis** (any site)
- **Kaposi's sarcoma**
- **Non-Hodgkin's lymphoma, primary CNS lymphoma**
- **HIV encephalopathy; HIV wasting syndrome**
- **Recurrent bacterial pneumonia** (≥2 episodes in 12 months)

c) List 3 specific pathogens with antibiotic treatment. (3 marks)

- **Pneumocystis jirovecii**: trimethoprim-sulfamethoxazole 15-20 mg/kg/day in 3 divided doses for 21 days; add prednisolone if PaO₂ <70 mmHg **[core]**
- **Cryptococcus neoformans (meningitis)**: induction with liposomal amphotericin B 3-4 mg/kg/day + flucytosine 100 mg/kg/day for 2 weeks, then fluconazole 400 mg daily for 8 weeks **[core]**
- **Cytomegalovirus retinitis**: ganciclovir 5 mg/kg IV every 12 hours for 14-21 days, then maintenance **[core]**
- **Toxoplasma**: pyrimethamine + sulfadiazine + folinic acid (rescue) for 6 weeks; or TMP-SMX for 4-6 weeks
- **MAC**: clarithromycin + ethambutol + rifabutin (3-drug regimen)
- **Tuberculosis**: standard 4-drug regimen (rifampicin, isoniazid, pyrazinamide, ethambutol) for 6-9 months

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ASHM (Australasian Society for HIV Medicine) PEP Guidelines • Australian HIV Guidelines

Question 14 | Returned Traveller — Malaria (12 marks)

A 35-year-old man presents to your emergency department with a 4-day history of fever, headache, and rigors. He returned from a 3-week trip to Papua New Guinea 2 weeks ago, where he spent time in rural areas and reports occasional missed doses of his malaria prophylaxis (doxycycline). He is otherwise well. On examination, his vital signs are: heart rate 110 beats per minute, blood pressure 100/60 millimetres of mercury, respiratory rate 22 breaths per minute, peripheral oxygen saturation 97 percent on room air, temperature 39.0 degrees Celsius. He has palpable splenomegaly. Bedside glucose 4.2 mmol/L.

a) List 4 differential diagnoses for fever in a returned traveller from PNG / SE Asia. (4 marks)

- **Malaria** (*Plasmodium falciparum* most concerning; vivax and ovale also common in PNG); incubation 1-4 weeks (*falciparum*) up to months (*vivax* / *ovale*) [core]
- **Dengue fever** — endemic in PNG; incubation 4-14 days; thrombocytopenia, leukopenia; haemorrhagic / shock syndrome [core]
- **Typhoid (*Salmonella typhi*)** — incubation 1-3 weeks; relative bradycardia, rose spots, diarrhoea or constipation, hepatosplenomegaly [core]
- **Leptospirosis** — water exposure; biphasic illness; conjunctival suffusion, calf pain, hepato-renal involvement [core]
- Acute schistosomiasis (Katayama syndrome — freshwater exposure)
- Rickettsial infection (scrub typhus, typhus) — eschar; doxycycline-responsive
- Viral haemorrhagic fevers (rare; consider in specific exposures)
- Common viral / bacterial infections (COVID-19, influenza, bacterial pneumonia, urinary tract infection)

b) List 4 investigations for suspected malaria with rationale. (4 marks)

- **Thick and thin blood films** (stained with Giemsa) — gold standard for diagnosis and species identification; quantify parasitaemia (percentage of red cells infected) [core]
- **Rapid diagnostic test (RDT) — lateral-flow antigen test** (detects HRP2 for *falciparum*, pLDH for *vivax/ovale/malariae*) — useful when microscopy not immediately available [core]
- **Full blood count** — anaemia, thrombocytopenia (very common in malaria), schistocytes; **renal and liver function** — AKI in severe malaria, raised LFTs [core]
- **Blood culture** — exclude bacterial co-infection (typhoid, sepsis); lactate, glucose, blood gas (severe malaria with metabolic acidosis, hypoglycaemia) [core]
- **Repeat blood films at 12-24 hours if initially negative** (parasitaemia may be below detection threshold; 3 consecutive negatives needed to exclude)
- Dengue NS1 antigen and IgM/IgG
- Stool culture (typhoid), urinalysis

c) List 4 features of severe malaria AND state the empirical treatment. (4 marks)

- **Severe *falciparum* malaria features:** parasitaemia >5 percent (or >2 percent in non-immune); cerebral malaria (impaired consciousness, seizures); acute kidney injury; metabolic acidosis (lactate >5); respiratory distress / ARDS; hypoglycaemia (<2.2 mmol/L); haemoglobin <70; coagulopathy / DIC [core]
- **Treatment of severe malaria:** artesunate 2.4 mg/kg IV at 0, 12, 24 hours, then daily (per WHO and Australian guidelines); follow with full oral course of artemether-lumefantrine or mefloquine [core]
- **Treatment of uncomplicated malaria:** artemether-lumefantrine (Riamet) 6 doses over 3 days OR mefloquine 25 mg/kg total OR atovaquone-proguanil (Malarone) [core]
- **For *Plasmodium vivax* / *ovale*:** add primaquine 30 mg orally daily for 14 days (eliminate hypnozoites; check G6PD first to avoid haemolysis) [core]

- Specialist input (infectious diseases / tropical medicine); reportable disease
- Avoid treating empirically without confirmation if possible — may delay correct diagnosis

References: *eTG Therapeutic Guidelines — Antibiotic* • *eTG (Therapeutic Guidelines, current)* • *WHO Malaria Treatment Guidelines* • *Australian Tropical Diseases Society*

Question 15 | Febrile Neutropenia (11 marks)

A 32-year-old woman undergoing chemotherapy for breast cancer (last cycle 8 days ago) presents to your emergency department with fever and malaise for the past 12 hours. She has had no specific localising symptoms. On arrival her vital signs are: heart rate 115 beats per minute, blood pressure 105/65 millimetres of mercury, respiratory rate 20 breaths per minute, peripheral oxygen saturation 98 percent on room air, temperature 38.5 degrees Celsius. Examination is unremarkable. Her full blood count: white cell count $1.5 \times 10^9/L$; absolute neutrophil count $0.4 \times 10^9/L$ (severe neutropenia).

a) Define febrile neutropenia AND state its significance. (3 marks)

- **Febrile neutropenia** = single oral temperature $\geq 38.3^\circ C$ OR sustained temperature $\geq 38.0^\circ C$ for 1 hour, with **absolute neutrophil count** $< 0.5 \times 10^9/L$ (or expected to fall below this within 48 hours) **[core]**
- **Mortality is high** if untreated (up to 70 percent); strict requirement for empirical antibiotics within 1 hour of presentation **[core]**
- **Classical features of infection are often absent** due to the inability to mount inflammatory response; absence of abnormal physical findings does NOT exclude serious infection **[core]**
- MASCC score risk stratification (≥ 21 = low-risk; outpatient management may be appropriate)
- Sources of infection — chemotherapy mucositis, indwelling devices, opportunistic pathogens

b) State 5 management priorities including specific antibiotic regimen. (5 marks)

- **Empirical broad-spectrum antibiotics WITHIN 1 HOUR** — piperacillin-tazobactam 4.5 g IV every 8 hours (or cefepime 2 g IV every 8 hours if low-risk); covers gram-positive, gram-negative, and Pseudomonas **[core]**
- **Add vancomycin 25 mg/kg IV loading then 15-20 mg/kg every 12 hours** if any of: line infection, MRSA colonisation, severe mucositis, skin or soft tissue infection, haemodynamic instability **[core]**
- **Take blood cultures BEFORE antibiotics (if no delay)** — peripheral and from any indwelling catheter / central line; urine, respiratory specimens, line-tip cultures **[core]**
- **Resuscitation per Surviving Sepsis Campaign** if septic; fluid bolus, lactate measurement, MAP target **[core]**
- **Granulocyte-colony stimulating factor (filgrastim 5 µg/kg/day SC)** considered to accelerate neutrophil recovery; admission to oncology / haematology unit; isolation **[core]**
- Ongoing investigation if no source identified — consider HRCT chest, CT abdomen / pelvis, echocardiography (endocarditis), abdominal ultrasound
- Consider antifungal cover (caspofungin or voriconazole) if persistent fever after 96 hours of antibiotics

c) List 3 factors that would influence antibiotic choice. (3 marks)

- **Local resistance patterns / hospital antibiogram** — Pseudomonas, ESBL, MRSA, VRE prevalence **[core]**
- **Recent antibiotic exposure** — alters likely organism / resistance; previous infections; colonisation status **[core]**
- **Allergies and adverse drug reactions** — need clear documentation; alternative regimen for penicillin anaphylaxis (vancomycin + ciprofloxacin + metronidazole) **[core]**
- Renal and hepatic function — adjust doses
- Drug interactions with chemotherapy / anti-emetics
- Source / focus of infection (line, mucositis, GI, respiratory, urinary)

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • Australian Cancer Network Febrile Neutropenia Guidelines

Question 16 | Acute Pyelonephritis with Urosepsis (10 marks)

A 25-year-old man presents to your emergency department with a 2-day history of fever, dysuria, and right-sided back pain. He has no previous medical problems. On arrival his vital signs are: heart rate 125 beats per minute, blood pressure 90/60 millimetres of mercury, respiratory rate 24 breaths per minute, peripheral oxygen saturation 97 percent on room air, temperature 39.0 degrees Celsius. Examination shows right costovertebral angle tenderness.

a) List 3 likely causative organisms. (3 marks)

- **Escherichia coli** (75-90 percent of uncomplicated pyelonephritis) **[core]**
- **Other Enterobacteriaceae** — *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterobacter* species **[core]**
- **Staphylococcus saprophyticus** (young women predominantly); **Enterococcus faecalis** **[core]**
- *Pseudomonas aeruginosa* (in catheterised, structural abnormality, recent urological procedure)
- Group B streptococcus (especially in diabetes, pregnancy)

b) State 4 immediate management priorities (drug, dose, end-points). (4 marks)

- **Empirical intravenous antibiotics** — **amoxicillin 2 g IV + gentamicin 5 mg/kg IV daily** (per eTG; for first-presentation, no allergy); OR **ceftriaxone 1 g IV daily** as alternative **[core]**
- **Fluid resuscitation** — 0.9 percent saline 30 mL/kg crystalloid bolus (approximately 2 L for 70 kg adult); vasopressor (noradrenaline) if persistent hypotension after fluid **[core]**
- **Investigations** — blood cultures BEFORE antibiotics; urine culture; renal function; lactate; non-contrast CT KUB if obstructing stone or perinephric abscess suspected; consider renal ultrasound **[core]**
- **Continuous monitoring and hourly review** in resuscitation bay; urinary catheter for output monitoring; early surgical referral if obstructed system or abscess **[core]**
- Analgesia (cautious opioid; NSAIDs avoided in AKI / shock)
- Anti-emetic, fluid balance, electrolyte monitoring
- Investigate underlying anatomical / functional cause (stone, vesicoureteric reflux, BPH) — more important in male / atypical patients

c) List 3 indications for urological intervention. (3 marks)

- **Obstructed system with infection** (hydronephrosis with sepsis) — decompression with percutaneous nephrostomy or retrograde stent (life-saving) **[core]**
- **Perinephric abscess or renal abscess** — drainage by interventional radiology or surgery **[core]**
- **Failure of medical management after 48-72 hours** of appropriate antibiotics; persistent bacteraemia **[core]**
- Single / transplanted kidney with infection
- Bilateral obstruction or AKI
- Emphysematous pyelonephritis (gas in renal parenchyma — surgical / percutaneous drainage; diabetic predisposition)

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 95

Question 17 | Toxic Shock Syndrome (10 marks)

A 19-year-old woman presents to your emergency department with a 24-hour history of fever, vomiting, diarrhoea, and a diffuse erythematous rash. She uses tampons and her menstrual period started 3 days ago. On examination, she is obtunded (Glasgow Coma Score 12), with diffuse macular erythroderma sparing the palms and soles, but with strawberry tongue, conjunctival injection, and mucosal hyperaemia. Her vital signs: heart rate 145 beats per minute, blood pressure 70/40 millimetres of mercury, respiratory rate 32 breaths per minute, peripheral oxygen saturation 94 percent on room air, temperature 40.1 degrees Celsius.

a) List the diagnostic criteria for staphylococcal toxic shock syndrome (4 components). (4 marks)

- **Fever ≥ 38.9 degrees Celsius (often >39) [core]**
- **Diffuse macular erythroderma** (sun-burn-like rash); subsequent skin desquamation 1-2 weeks later, particularly palms and soles [core]
- **Hypotension** (systolic blood pressure ≤ 90 in adults, or orthostatic drop ≥ 15) [core]
- **Multi-organ involvement (≥ 3 systems)**: gastrointestinal (vomiting, diarrhoea); muscular (myalgia, raised creatine kinase $>2\times$ normal); mucosal (conjunctival, oropharyngeal, vaginal hyperaemia); renal (creatinine $>2\times$ normal; pyuria); hepatic (LFTs $>2\times$ normal); haematological (platelets <100); neurological (altered consciousness, no focal signs) [core]
- Negative blood cultures (typically) — TSS is toxin-mediated, not bacteraemic
- Tampon use (menstrual TSS), nasal packing, post-surgical wound colonisation, post-partum
- Negative serology for measles, leptospirosis, Rocky Mountain spotted fever (excludes alternative diagnoses)

b) State 4 immediate management priorities. (4 marks)

- **Aggressive fluid resuscitation** — 0.9 percent saline 30 mL/kg over first hour; further boluses guided by haemodynamic response; vasopressor (noradrenaline) if persistent hypotension [core]
- **Empirical antibiotics** — **flucloxacillin 2 g IV every 4-6 hours + clindamycin 600 mg IV every 8 hours**; clindamycin suppresses toxin production (key); add vancomycin if MRSA risk [core]
- **Source control** — REMOVE TAMPON (or other foreign body); drain any abscess; debride wound; remove infected device [core]
- **Intensive care unit admission** with multi-organ support; intravenous immunoglobulin 1-2 g/kg may be considered for severe / refractory shock (limited evidence; specialist input) [core]
- Investigate for source (vagina, surgical wounds, skin)
- Steroids — controversial; consider in refractory shock
- Discharge counselling — risk of recurrence; avoid tampons in early follow-up

c) List 2 differences between staphylococcal and streptococcal TSS. (2 marks)

- **Staphylococcal TSS**: usually menstrual / tampon-related; blood cultures usually NEGATIVE (toxin-mediated); skin desquamation prominent later [core]
- **Streptococcal TSS**: associated with severe soft-tissue infection (necrotising fasciitis), often blood cultures POSITIVE for Group A streptococcus; higher mortality (20-50 percent vs 5-10 percent) [core]
- Treatment principles similar — penicillin or ceftriaxone + clindamycin
- Streptococcal — closer association with necrotising soft-tissue infection requiring debridement

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 250

Question 18 | Tetanus and Tetanus-Prone Wounds (9 marks)

A 65-year-old man presents to your emergency department after cutting his right lower leg on a rusty piece of wire while gardening. He cleaned the wound with water from a garden hose and wrapped it in an old cloth. He was last vaccinated with diphtheria-tetanus 25 years ago. On examination, the wound is 5 centimetres long, deep, with surrounding contusion and dirt contamination.

a) List 5 features that make a wound 'tetanus-prone'. (5 marks)

- **Deep / penetrating wound** with compromised tissue oxygenation **[core]**
- **Significant contamination** (soil / dirt, faeces, foreign body) **[core]**
- **Devitalised / necrotic tissue** (crush injury, burn, bite, frostbite) **[core]**
- **Time delay greater than 6 hours** since wound; **chronic wound** **[core]**
- **Compound (open) fracture** or puncture wound **[core]**
- Burns, frostbite, gangrene
- Animal bites (especially with anaerobic potential)

b) State the indications for tetanus immunoglobulin (TIG) AND state the dose. (2 marks)

- **TIG indicated:** tetanus-prone wound with INCOMPLETE vaccination history (less than 3 doses or unknown); OR more than 5 years since last booster AND tetanus-prone wound; OR immunocompromised patient **[core]**
- **Dose: 250 IU intramuscular** (adult, single dose) — gives 4-6 weeks of passive immunity; given at SEPARATE site from active tetanus vaccine **[core]**
- If wound >24 hours old or extensive contamination — 500 IU IM
- This patient: last booster 25 years ago, tetanus-prone wound — TIG INDICATED + tetanus toxoid

c) List 2 features of clinical tetanus. (2 marks)

- **Trismus (lockjaw)** — most common presenting feature; difficulty opening the mouth from masseter spasm **[core]**
- **Risus sardonicus** (sustained facial grin); muscle rigidity and spasms (opisthotonus, abdominal rigidity) **[core]**
- Autonomic instability — blood pressure swings, tachycardia, sweating
- Generalised tonic spasms triggered by minor stimuli
- Painful muscle contractions
- Treatment: tetanus immunoglobulin, antibiotics (metronidazole), wound debridement, sedation and intensive care unit admission

References: Australian Immunisation Handbook • eTG (Therapeutic Guidelines, current) • eTG Therapeutic Guidelines — Antibiotic • ACEM clinical policies and statements

Question 19 | Infective Endocarditis (11 marks)

A 42-year-old man with a history of intravenous drug use presents to your emergency department with a 2-week history of fever, fatigue, and night sweats, with new shortness of breath and haemoptysis over the past 3 days. On examination his vital signs: heart rate 110 beats per minute, blood pressure 110/70 millimetres of mercury, respiratory rate 24 breaths per minute, peripheral oxygen saturation 92 percent on room air, temperature 38.7 degrees Celsius. He has a loud (grade IV) systolic murmur best heard at the left lower sternal border. His chest radiograph shows multiple bilateral peripheral nodular opacities, several of which appear cavitating.

a) List 4 clinical features supporting infective endocarditis (peripheral signs). (4 marks)

- **Fever and constitutional symptoms** (weight loss, night sweats, fatigue) [core]
- **Cardiac murmur** (new or changed) — particularly tricuspid involvement in IV drug users (right-sided endocarditis) [core]
- **Peripheral signs:** Janeway lesions (painless erythematous macules on palms / soles), Osler's nodes (painful nodules on finger pads), splinter haemorrhages, Roth spots (retinal haemorrhages) [core]
- **Embolic phenomena:** stroke (TIA, ischaemic), splenic / renal infarcts; septic emboli to lung (in right-sided endocarditis — this case — multiple cavitating pulmonary nodules) [core]
- Splenomegaly, lymphadenopathy
- Gum bleeding, microscopic haematuria, mild anaemia

b) State the modified Duke criteria categories (major and minor — list components of each). (4 marks)

- **Major Duke criteria (1) Positive blood cultures** with typical organisms (viridans streptococci, *Streptococcus bovis*, *Staphylococcus aureus*, Enterococci) in 2 separate cultures, OR persistently positive cultures [core]
- **Major Duke criteria (2) Echocardiographic evidence** of endocardial involvement — vegetation, abscess, new valvular regurgitation [core]
- **Minor Duke criteria:** predisposition (prosthetic valve, IV drug use, prior endocarditis, structural heart disease); fever >38°C; vascular phenomena (emboli, infarcts, mycotic aneurysms); immunological phenomena (Osler's, Roth spots, glomerulonephritis); single positive blood culture [core]
- **Diagnosis: definitive IE** = 2 major OR 1 major + 3 minor OR 5 minor; **possible IE** = 1 major + 1 minor OR 3 minor [core]

c) State the empirical antibiotic regimen for this patient. (3 marks)

- **For native valve IE in IV drug user** (suspected *Staphylococcus aureus*): **flucloxacillin 2 g IV every 4-6 hours** (or vancomycin if MRSA risk); + **gentamicin 1 mg/kg IV every 8 hours** (synergy for first 2 weeks) [core]
- **If MRSA suspected or vancomycin first-line:** vancomycin 25 mg/kg loading then 15-20 mg/kg every 12 hours [core]
- **3-5 sets of blood cultures** BEFORE antibiotics over 1-2 hours (unless very septic — 2 sets, then antibiotics); duration 4-6 weeks per organism [core]
- Echocardiography — transthoracic first; transoesophageal if negative TTE but high clinical suspicion (sensitivity 90 percent vs 50 percent)
- Cardiology / cardiothoracic surgery referral — indications for surgery: heart failure, uncontrolled infection, large vegetations (>10 mm), embolic events, prosthetic valve, aortic / paravalvular abscess

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • Modified Duke Criteria • ESC IE Guidelines 2023

Question 20 | Active Pulmonary Tuberculosis (10 marks)

A 45-year-old man originally from Vietnam (in Australia for 5 years) presents to your emergency department with a 3-month history of progressive cough productive of blood-streaked sputum, weight loss (8 kilograms), drenching night sweats, and fevers. He has no other significant medical history. His vital signs: heart rate 95 beats per minute, blood pressure 120/75 millimetres of mercury, respiratory rate 22 breaths per minute, peripheral oxygen saturation 96 percent on room air, temperature 37.6 degrees Celsius. Chest examination reveals decreased breath sounds in the right upper zone with crepitations. Chest radiograph shows a right upper lobe cavitating lesion with surrounding consolidation.

a) List 4 epidemiological / clinical features supporting active tuberculosis. (4 marks)

- **High-risk demographic** — origin from TB-endemic country (Asia, Africa, Pacific islands); recent migration **[core]**
- **Classical 'B-symptoms'** — chronic (weeks-months) cough with haemoptysis, night sweats, weight loss, fever, anorexia **[core]**
- **Apical / upper-lobe cavitating consolidation** on chest radiograph (this case) — classic for reactivation TB **[core]**
- **Risk factors for reactivation** — diabetes, HIV, immunocompromise, chronic kidney disease, incarceration, homelessness, alcohol use disorder **[core]**
- Contact history — known exposure to active TB
- Negative response to standard antibiotics for presumed bacterial pneumonia

b) List 4 investigations. (4 marks)

- **Sputum acid-fast bacilli (AFB) smear and culture × 3 samples** on consecutive days; sputum nucleic acid amplification test (PCR — Xpert MTB/RIF) for rapid diagnosis and rifampicin resistance **[core]**
- **Tuberculin skin test or interferon-gamma release assay (IGRA, QuantiFERON-TB Gold)** — assesses prior exposure / latent TB; positive supports diagnosis **[core]**
- **Computed tomography of chest with contrast** — characterises cavitation, lymphadenopathy, miliary spread; differentiates from malignancy **[core]**
- **HIV testing** (high prevalence co-infection); full blood count, C-reactive protein, urea and electrolytes, liver function tests (baseline before drug therapy) **[core]**
- Bronchoscopy with washing if sputum negative
- Chest radiograph (initial); follow-up computed tomography
- Notify public health authority — TB is a notifiable disease

c) State the standard 4-drug TB treatment regimen with duration. (2 marks)

- **Initial intensive phase (8 weeks): Rifampicin + Isoniazid + Pyrazinamide + Ethambutol (RIPE)** — weight-based dosing daily **[core]**
- **Continuation phase (16 weeks): Rifampicin + Isoniazid** daily (or thrice weekly if directly observed therapy); **total 6 months** for uncomplicated; longer for extrapulmonary, drug-resistant, or HIV co-infection **[core]**
- Pyridoxine 25 mg orally daily (prevents INH-induced peripheral neuropathy)
- Public health notification, contact tracing, infection control (negative pressure isolation), infectious diseases / respiratory consultation

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • Australian National TB Guidelines • ACEM clinical policies and statements

Question 21 | DRESS Syndrome (Drug Reaction with Eosinophilia and Systemic Symptoms) (10 marks)

A 50-year-old woman presents to your emergency department with a 5-day history of fever and a widespread pruritic morbilliform (measles-like) rash. She started carbamazepine 6 weeks ago for trigeminal neuralgia. On examination, she has widespread maculopapular eruption on the face, trunk, and limbs, with bilateral periorbital oedema, cervical lymphadenopathy, and mild hepatomegaly. Vital signs: heart rate 110, respiratory rate 22, peripheral oxygen saturation 96 percent on room air, temperature 39.0 degrees Celsius. Her bloods: white cell count 22 with prominent eosinophilia ($4.5 \times 10^9/L$), atypical lymphocytes on film; ALT 800; creatinine 220.

a) List 4 features supporting DRESS syndrome (RegiSCAR criteria). (4 marks)

- **Drug exposure within previous 2-8 weeks** (typical latent period; unusual for early or immediate drug reaction) **[core]**
- **Widespread skin rash** — morbilliform, maculopapular, often with facial / periorbital oedema **[core]**
- **Multi-organ involvement** — hepatitis (raised ALT, ALP), nephritis (raised creatinine), pneumonitis, cardiac, thyroid **[core]**
- **Haematological abnormalities** — eosinophilia ($\geq 1.5 \times 10^9/L$), atypical lymphocytes on blood film **[core]**
- Lymphadenopathy
- Fever (often >38.5 degrees Celsius)
- Negative tests for other causes (viral exanthem, parasitic infection)

b) List 3 culprit drug classes. (3 marks)

- **Aromatic anticonvulsants** — carbamazepine (this case), phenytoin, phenobarbitone, lamotrigine **[core]**
- **Sulfa drugs** — sulfasalazine, trimethoprim-sulfamethoxazole, dapsone **[core]**
- **Allopurinol** (especially with HLA-B*5801) **[core]**
- Antibiotics — minocycline, vancomycin, beta-lactams
- Antiretrovirals — abacavir (HLA-B*5701), nevirapine

c) State 3 management priorities. (3 marks)

- **STOP all suspected medications** (carbamazepine and any other recent drugs in particular) **[core]**
- **Systemic corticosteroids** — prednisolone 0.5-1 mg/kg/day (40-60 mg for 70 kg adult); slow taper over weeks-months (relapse common); cyclosporine or IVIG in refractory cases **[core]**
- **Inpatient admission** for monitoring and supportive care; specialist input from dermatology, internal medicine, allergy / clinical immunology **[core]**
- Investigate and treat organ-specific involvement — hepatology consultation if severe hepatitis; nephrology if AKI
- Long-term follow-up — late autoimmune complications (thyroiditis, type 1 diabetes, lupus, vitiligo) up to 1 year post
- Document drug allergy clearly; family members may carry HLA-related predispositions

References: eTG Therapeutic Guidelines — Dermatology • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 247

Question 22 | Severe Sepsis — Surviving Sepsis Bundle (11 marks)

A 72-year-old man presents to your emergency department with a 24-hour history of confusion, fever, and generalised weakness. He has a history of type 2 diabetes mellitus and a recent urinary tract infection treated with oral cephalexin. On arrival his vital signs: Glasgow Coma Score 13, heart rate 130 beats per minute, blood pressure 85/50 millimetres of mercury (mean arterial pressure 62), respiratory rate 28 breaths per minute, peripheral oxygen saturation 92 percent on room air, temperature 39.2 degrees Celsius. Bloods: white cell count 22, lactate 4.5, creatinine 280 (baseline 90), bilirubin 45, platelets 95, INR 1.7, glucose 18.

a) Apply the SOFA score concept — list 4 organ system derangements suggesting septic shock. (4 marks)

- **Cardiovascular:** hypotension (MAP <65 despite resuscitation), need for vasopressor — septic shock **[core]**
- **Renal:** acute kidney injury — creatinine 280 (3× baseline) → KDIGO stage 3 **[core]**
- **Hepatic:** raised bilirubin (45 — >2× normal); INR 1.7 (mild coagulopathy) **[core]**
- **Haematological:** thrombocytopenia (platelets 95) suggests consumptive coagulopathy / DIC;
- **respiratory:** hypoxia (SpO₂ 92 on room air) **[core]**
- **Neurological:** confusion / decreased GCS
- **Sepsis-induced multi-organ dysfunction** (sepsis = life-threatening organ dysfunction from dysregulated host response to infection — Sepsis-3 definition)

b) List the 4 components of the Surviving Sepsis Hour-1 Bundle. (4 marks)

- **Measure lactate** — repeat if >2 mmol/L; aim for normalisation **[core]**
- **Take blood cultures** (and other appropriate cultures) BEFORE antibiotics **[core]**
- **Start broad-spectrum intravenous antibiotics** within 1 hour — empirical based on suspected source (this case: piperacillin-tazobactam 4.5 g IV + vancomycin 25 mg/kg IV loading for urosepsis with risk of ESBL or MRSA) **[core]**
- **Begin rapid intravenous fluid resuscitation** — 30 mL/kg crystalloid (approximately 2 L for 70 kg adult) over the first 3 hours; balanced crystalloid (Hartmann's) preferred over saline **[core]**
- **Vasopressors (noradrenaline first-line)** if MAP <65 mmHg after fluid; aim MAP ≥65

c) List 3 ongoing management priorities (within first 6 hours). (3 marks)

- **Identify and treat source** — imaging (computed tomography abdomen/pelvis), urinalysis with culture, sources of infection; consider drainage of any abscess, obstructed system **[core]**
- **Glycaemic control** — target glucose 8-10 mmol/L; insulin sliding scale; avoid hypoglycaemia **[core]**
- **ICU / HDU admission** with central venous catheter, arterial line, continuous monitoring; consider stress-dose hydrocortisone (200 mg daily) if vasopressor-resistant; lung-protective ventilation if intubated **[core]**
- Lactate trends, MAP and urine output monitoring
- Investigate end-organ damage — ECG, troponin, coagulation, CK, lactate
- Multi-disciplinary input — infectious diseases, nephrology, intensive care

References: Surviving Sepsis Campaign 2021 • eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements