CLINICAL DECISION-SUPPORT · BENCHMARK REVIEW

A trail of *clinical* decisions

Twelve patient encounters — from presentation to dispensing — tracing how each decision was reached, justified, and safety-checked at pharmacy-level triage.

12	6	2	4
CASES	CRITICAL	REFER	IMPORTANT

Source benchmark_pt009_pt020.csv · 41 fields per case
Scope Age 7–72 · 1 pregnancy · 1 paediatric · 3 elderly
Guidelines NEML 2020 · FMOH STG 6th ed. · WHO · GINA · FIGO

PART ONE

Executive *summary*

This benchmark captures twelve clinical encounters processed end-to-end by a pharmacy-facing decision-support engine. Each case follows an **eleven-step pipeline**: from the first presenting symptom all the way to a dispensing decision. The value of the dataset lies less in any individual diagnosis than in the **consistency of the reasoning pattern** — particularly how comorbidities, prior exposures, allergies and physiological state override what would otherwise be first-line choices.

PRIORITY	DISPENSABLE	AGE RANGE	SPECIAL CASES
6 · 2 · 4	10 yes · 2 no	7–72 years	1 pregnancy · 1 paeds

The eleven-step pipeline applied to every case — grouped into four phases: intake, reasoning, plan, and safety.

CASE INDEX

ID	PATIENT	CHIEF COMPLAINT	LEADING DIAGNOSIS	PRIORITY
PT009	35 · male	Cough	URTI	IMPORTANT
PT010	38 · female	Loin pain	Acute pyelonephritis	CRITICAL
PT011	45 · male	Jaundice	Anti-TB drug-induced hepatotoxicity	CRITICAL
PT012	48 · female	Fatigue	Iron deficiency anaemia secondary to chronic men	IMPORTANT
PT013	50 · male	Chest pain	Acute Coronary Syndrome	CRITICAL
PT014	28 · female	RLQ pain	Acute appendicitis	CRITICAL
PT015	65 · male	Suprapubic pain	Urosepsis	REFER
PT016	68 · female	Falls × 3 in 4wk	Diazepam-induced falls and increased confusion i	IMPORTANT
PT017	40 · male	Fever	Uncomplicated Plasmodium falciparum malaria	IMPORTANT
PT018	7 · male	Watery diarrhoea ×8	Acute watery gastroenteritis with moderate dehyd	CRITICAL
PT019	33 · female	Lower abdominal pain	Pelvic Inflammatory Disease	CRITICAL
PT020	72 · male	Facial/neck swelling	Superior Vena Cava (SVC) Syndrome secondary to l	REFER

PART TWO

Six decision *patterns*

Six patterns recur across the dataset. Each pattern is the generalised rule that a specific case is applying — and each has a clear safety rationale with a case-level precedent.

01 Comorbidity overrides prevent reflex prescribing

OBSERVED IN PT009 · PT012 · PT013 · PT017

When a patient has a chronic condition (asthma, CKD, G6PD, iron-deficiency anaemia), the engine checks whether the presenting symptoms actually implicate that condition before treating it. PT009 resists escalating asthma therapy for a viral URTI; PT017 excludes primaquine because of G6PD; PT013 halves morphine for CKD. This prevents reflex prescribing when the comorbidity is not the driver.

02 Prior exposure and local resistance drive antibiotic choice

OBSERVED IN PT010 · PT015

PT010 avoids ciprofloxacin because the patient had a recent fluoroquinolone course plus escalating local resistance; ceftriaxone is chosen instead. PT015 (urosepsis) applies the same logic under acute pressure. Antibiotic choice follows patient history plus local epidemiology, never a default.

03 Mandatory-stop triggers are respected over continuity

OBSERVED IN PT011 · PT012 · PT015 · PT016

PT011 stops all four anti-TB drugs on jaundice per FMOH protocol. PT012 stops self-prescribed ibuprofen in menorrhagia-driven IDA. PT015 holds tamsulosin and metformin in septic shock. PT016 initiates a diazepam taper in an elderly faller. When a drug becomes net-harmful, stopping is prioritised over clinical convenience.

04 Allergy and genotype safety nets are non-negotiable

OBSERVED IN PT014 · PT017

PT014 (pregnant, documented penicillin anaphylaxis) requires aztreonam — a monobactam with no beta-lactam cross-reactivity. PT017 (G6PD-deficient) excludes primaquine and prefers artemether-lumefantrine. These safety nets override first-line guidelines every time.

05 CONCLUDE_AND_REFER escalates beyond pharmacy scope

OBSERVED IN PT015 · PT020

PT015 (urosepsis, qSOFA 3/3) and PT020 (SVC syndrome — oncological emergency) are flagged for escalation. The engine starts safe bridging therapy (IV fluids, empiric antibiotic, steroid switch) but explicitly refuses to manage the condition at pharmacy level and triggers ambulance transfer.

06 Drug-disease interactions are weighted equally with drug-drug

OBSERVED IN PT010 · PT011 · PT016 · PT020

The engine does not limit itself to DDIs. PT010 flags metformin/lactic-acidosis risk in febrile illness. PT011 flags residual rifampicin CYP450 induction persisting 2–4 weeks after stopping. PT020 flags a triple hypokalaemia risk (dexamethasone + furosemide + salbutamol). These are drug-state considerations, not classic DDI tables.

CASE STUDY

PT009

35-year-old male

IMPORTANT SAFE TO DISPENSE

DECISION TRAIL

I PRESENTATION

> *Cough | runny nose | sore throat x 3 days; no fever; no breathlessness beyond baseline*

BP 118/76 mmHg · HR 84 bpm · RR 16 brpm · Temp 37.4C · SpO2 98% · Wt 74 kg

II PATIENT CONTEXT

COMORBIDITIES Asthma (mild intermittent)

CURRENT MEDS
- Salbutamol MDI 100mcg 2 puffs PRN
- Beclomethasone MDI 100mcg 2 puffs BD

ALLERGIES *No known allergies*

III TARGETED HISTORY

Is your breathing worse than usual?

→ *No more than my usual mild wheeze*

Fever at home?

→ *No*

Sick contact?

→ *Yes — colleague had a cold last week*

IV CLARIFYING QUESTION

> *Do you have any wheezing or chest tightness that is noticeably worse than your usual asthma baseline?*

V DIFFERENTIAL DIAGNOSIS

#1 URTI (viral pharyngitis/rhinosinusitis) — 60%

ICD-10 · J06.9

Upper-airway symptoms dominant; SpO2 98% maintained; no lower-respiratory signs; afebrile

#2 Asthma exacerbation (mild/atypical) — 20%

ICD-10 · J45.20

Known asthmatic; cough can trigger mild bronchospasm; SpO2 normal argues against active exacerbation at this stage

#3 Allergic rhinitis — 15%

ICD-10 · J30.1

Rhinorrhoea + persistent cough; seasonal or contact-triggered pattern possible

VI CLINICAL REASONING

COMORBIDITY OVERRIDE APPLIED: asthma is present but rhinorrhoea and sore throat are upper-airway-only symptoms not attributable to asthma. URTI leads. No antibiotic indication at this stage — viral aetiology (3-day duration; afebrile; sick contact; no purulent discharge). Continue ICS/SABA unchanged; do NOT step up asthma therapy based on cough alone.

VII PHARMACOTHERAPY

Paracetamol 500mg-1g

TDS-QDS x 5/7 · Oral · OTC/P · Antipyretic and analgesic for sore throat; counsel max 4g/24h; avoid doubling with other paracetamol products · Guideline: NEML 2020 §4.7

Loratadine 10mg

OD x 7/7 · Oral · OTC · Non-sedating antihistamine for rhinorrhoea and sneezing; low sedation risk; advise caution if driving · Guideline: NEML 2020 §4.2

CONTINUE

Beclomethasone MDI 100mcg

2 puffs BD · Inhaled · POM (maintenance — not newly prescribed today) · Do NOT discontinue ICS during URTI — rebound exacerbation risk · Guideline: GINA 2024

CONTINUE

Salbutamol MDI 100mcg

2 puffs PRN for wheeze or breathlessness · Inhaled · POM (reliever) · If use exceeds 3x/day patient must seek review

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Warm saline gargle TDS

— Honey and lemon in warm water TDS for sore throat

— Increase fluid intake to 2-3L/day

NON-PHARMACOLOGICAL

— Rest

— Avoid triggers (cigarette smoke

— cold air

— known allergens)

— Steam inhalation BD

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— Refer to GP/clinic if: fever >38.5C persisting beyond 72h

— purulent nasal discharge beyond 10 days

— SpO2 falls below 95%

— asthma exacerbation signs develop (nocturnal wheeze

— inability to complete sentences)

FOLLOW-UP PLAN

— Review in 5 days or sooner if worsening; asthma action plan reinforced; patient counselled on exacerbation warning signs

X INTERACTION SCREEN

GROUP A — NEW × NEW

Paracetamol x Loratadine: no clinically significant pharmacokinetic or pharmacodynamic interaction · severity: none · SAFE

GROUP B — NEW × EXISTING

Loratadine x Beclomethasone: no interaction; inhaled ICS route avoids systemic steroid-antihistamine interaction · SAFE

Loratadine x Salbutamol: no pharmacodynamic antagonism · SAFE

Paracetamol x Salbutamol: no interaction · SAFE

GROUP C — RESIDUAL / DELAYED

None flagged

DRUG-DISEASE FLAGS

Asthma + Loratadine: non-sedating antihistamines do not worsen asthma or lower bronchodilator response at standard oral doses · SAFE

Asthma + Beclomethasone: therapeutic maintenance ICS — continue unchanged · BENEFIT

CONTRAINDICATIONS

None to dispensed medications

XI DISPENSING DECISION

Paracetamol 1g TDS x 5/7: DISPENSE (OTC/P) — counsel on max daily dose and avoid doubling

Loratadine 10mg OD x 7/7: DISPENSE (OTC) — low sedation risk; safe to combine

Beclomethasone + Salbutamol: CONTINUE (not newly dispensed today — existing supply)

CLINICAL SYNTHESIS

Viral URTI in mild intermittent asthmatic. Comorbidity override applied: cough and rhinorrhoea are upper-airway symptoms incompatible with asthma as the sole driver at this stage. All dispensed medications safe. Watchlist: asthma exacerbation if wheeze worsens. No antibiotic today.

GUIDELINES NEML 2020 | FMOH STG 6th edition | GINA 2024

CASE STUDY

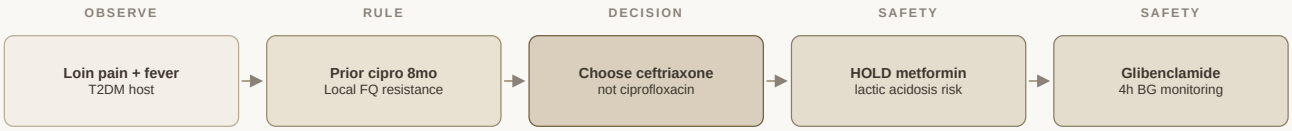
PT010

38-year-old female

CRITICAL | SAFE TO DISPENSE

pending culture result — empiric treatment appropriate while awaiting

DECISION TRAIL



I PRESENTATION

> *Right loin pain | fever | dysuria | urinary frequency x 2 days; one episode of vomiting; chills*

BP 130/82 mmHg · HR 102 bpm · RR 20 brpm · Temp 38.9C · SpO2 97% · Wt 68 kg

II PATIENT CONTEXT

COMORBIDITIES Type 2 Diabetes Mellitus

CURRENT MEDS

- Metformin 500mg BD
- Glibenclamide 5mg OD

ALLERGIES *No known allergies*

III TARGETED HISTORY

Is the pain one-sided or both sides?

→ *Right side only and radiating to the groin*

Any previous UTI?

→ *Yes — 2 episodes last year*

Prior antibiotic for UTI?

→ *Ciprofloxacin — last course 8 months ago*

Any blood in urine?

→ *Yes — pinkish*

IV CLARIFYING QUESTION

> *Have you received any antibiotic treatment for a urinary infection in the past 3 months — and if so which antibiotic did you take and did you complete the full course?*

V DIFFERENTIAL DIAGNOSIS

#1 Acute pyelonephritis — 75%

ICD-10 · N10

Right CVA tenderness + fever + dysuria in T2DM; unilateral loin-to-groin radiation; haematuria; high risk of complicated UTI in diabetic host

#2 Renal calculus with superimposed infection (obstructive uropathy) — 15%

ICD-10 · N20.0

Groin radiation pattern raises obstructive nephropathy; renal US urgently indicated to exclude obstruction

#3 Complicated ascending UTI without upper-tract involvement — 10%

ICD-10 · N39.0

Failed prior oral therapy scenario possible given recurrent UTI history and prior fluoroquinolone exposure

VI CLINICAL REASONING

High clinical probability for acute pyelonephritis in a T2DM patient. Diabetics carry increased risk of emphysematous pyelonephritis and fungal superinfection. Prior ciprofloxacin use and local resistance data in Nigeria drive selection of ceftriaxone over fluoroquinolones. Metformin MUST be held — lactic acidosis risk during febrile illness with any degree of renal stress. Glibenclamide hypoglycaemia risk is amplified by intercurrent illness — 4-hourly BG monitoring mandated.

VII PHARMACOTHERAPY

IV Ceftriaxone 1g

OD x 7-14/7 (step down to oral guided by C&S at 48-72h) · IV · POM · First-line for complicated UTI/pyelonephritis; covers E. coli and Klebsiella; await urine culture and sensitivity · Guideline: NEML 2020 §9.1 / FMOH STG Urology

Paracetamol 1g

TDS x 5/7 · Oral or IV · OTC/P · Antipyretic; NSAIDs ABSOLUTELY avoided (nephrotoxic + risk of diabetic papillary necrosis) · Guideline: NEML 2020 §4.7

HOLD RX REQUIRED **Metformin 500mg BD**

Until fully recovered and creatinine rechecked normal post-illness · Oral (held) · POM — prescriber instruction required · Risk: lactic acidosis in febrile illness with acute renal stress

Glibenclamide 5mg OD — CONTINUE WITH CAUTION

Reduce dose if BG <6 mmol/L; intercurrent illness amplifies hypoglycaemia risk; consider insulin sliding scale if BG remains uncontrolled · POM · Monitor BG every 4h

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Oral rehydration (water or ORS) to flush urinary tract; encourage 2.5L+ fluid daily; electrolyte-rich foods

NON-PHARMACOLOGICAL

— Admit for IV therapy; bed rest; strict 24h input-output chart; 4-hourly blood glucose monitoring chart; midstream urine for C&S before first antibiotic dose

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— Urology referral if no clinical improvement within 72h OR imaging shows hydronephrosis / perinephric abscess; Nephrology if creatinine rises

FOLLOW-UP PLAN

— Recheck FBC

— U&E

— creatinine

— urinalysis with C&S; antibiotic step-down guided by C&S result at 48-72h; Metformin restart review at discharge

X INTERACTION SCREEN

GROUP A — NEW × NEW

Ceftriaxone x Paracetamol: no clinically significant interaction · SAFE

GROUP B — NEW × EXISTING

Ceftriaxone x Glibenclamide: MODERATE RISK — sulphonylurea-mediated hypoglycaemia may be potentiated during systemic infection (impaired renal glucose clearance + ongoing insulin secretion); monitor BG every 4h; reduce glibenclamide dose if BG <6 mmol/L · severity: moderate

Metformin x febrile illness/renal stress: HOLD — lactic acidosis risk; this is a drug-disease interaction not a DDI

Paracetamol x Glibenclamide: no direct pharmacokinetic interaction · SAFE

GROUP C — RESIDUAL / DELAYED

None flagged from prior visits

DRUG-DISEASE FLAGS

T2DM + Pyelonephritis: NSAIDs absolutely contraindicated — nephrotoxic and risk of analgesic nephropathy / papillary necrosis in diabetic kidney

T2DM + Metformin: lactic acidosis risk in febrile illness — HOLD confirmed

T2DM + Glibenclamide: hypoglycaemia risk amplified by infection and reduced oral intake — strict monitoring

CONTRAINDICATIONS

Metformin: HELD (relative contraindication in febrile illness with renal risk)

NSAIDs: CONTRAINDICATED in diabetic nephropathy risk context

XI DISPENSING DECISION

IV Ceftriaxone 1g OD: ADMINISTER in hospital — POM; await C&S and adjust if resistance detected

Paracetamol 1g TDS: DISPENSE — OTC/P; safe

Metformin: DO NOT DISPENSE — HELD until recovery confirmed

Glibenclamide: CONTINUE with BG monitoring chart — POM

CLINICAL SYNTHESIS

Pyelonephritis in T2DM. Ceftriaxone over ciprofloxacin due to prior fluoroquinolone exposure. Metformin held; glibenclamide closely monitored for hypoglycaemia during febrile illness. Urine C&S sent before first dose. Renal US to exclude obstruction.

GUIDELINES NEML 2020 | FMOH STG 6th edition (Nephrology/Urology) | Nigerian Society of Nephrology Guidelines

CASE STUDY

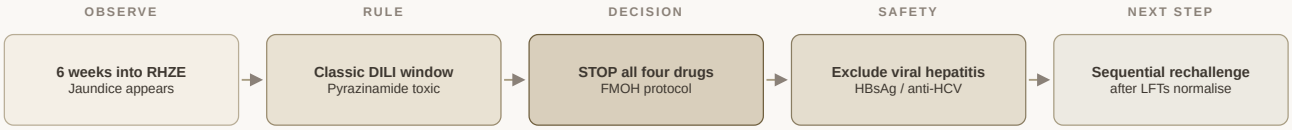
PT011

45-year-old male

CRITICAL DO NOT DISPENSE

pending LFT normalisation and rechallenge protocol

DECISION TRAIL



I PRESENTATION

> *Jaundice | dark urine | nausea | right upper quadrant discomfort x 1 week; no fever*

BP 122/78 mmHg · HR 88 bpm · RR 14 brpm · Temp 37.1C · SpO2 99% · Wt 62 kg

II PATIENT CONTEXT

COMORBIDITIES	Active Pulmonary Tuberculosis (on RHZE x 6 weeks)
CURRENT MEDS	Rifampicin 150mg + Isoniazid 75mg + Pyrazinamide 400mg + Ethambutol 275mg (fixed-dose combination) OD
ALLERGIES	*No known allergies*

III TARGETED HISTORY

Did you have any jaundice or liver problem before TB treatment?

→ No

Any alcohol use?

→ *Yes — occasional*

Prior liver disease?

→ No

Are you still taking all 4 TB tablets?

→ *Yes until yesterday*

IV CLARIFYING QUESTION

> *On average how many units of alcohol do you consume per week — and when did you last drink?*

V DIFFERENTIAL DIAGNOSIS

#1 **Anti-TB drug-induced hepatotoxicity (DILI)** 80%

ICD-10 · K71.6

Jaundice + dark urine 6 weeks into RHZE; classic DILI window; pyrazinamide most hepatotoxic of the four; ALT/AST urgently required

#2 **Viral hepatitis superimposed on ATT (hepatitis B or C reactivation)** 12%

ICD-10 · B16.9

ATT immunomodulation can unmask occult hepatitis B; must rule out with serology

#3 **Pre-existing liver disease unmasked by ATT** 8%

ICD-10 · K74.6

Alcohol history + DILI window; underlying cirrhosis or NAFLD possible; US and LFTs required

VI CLINICAL REASONING

Classic DILI presentation 6 weeks into first-line ATT. Pyrazinamide carries the highest hepatotoxic potential; rifampicin and isoniazid are also implicated. FMOH TB guideline mandates: STOP all 4 drugs immediately when clinical jaundice appears. Baseline LFTs should have been taken pre-treatment — absent baseline makes absolute rise assessment harder. Alcohol history (even moderate) compounds hepatotoxic risk. Sequential rechallenge after LFT normalisation per protocol: rifampicin first; add isoniazid; ethambutol last; pyrazinamide may be permanently excluded.

VII PHARMACOTHERAPY

STOP RX REQUIRED

all 4 anti-TB drugs IMMEDIATELY (Rifampicin + Isoniazid + Pyrazinamide + Ethambutol)

Hold pending LFT normalisation · POM — TB officer/physician decision · Guideline: FMOH NTP TB Treatment Guidelines 2022

IV Fluids (0.9% NaCl or Ringer Lactate)

As clinically indicated · IV · POM · Supportive — maintain hydration and electrolyte balance; correct hypoglycaemia if present · Guideline: FMOH STG 6th edition

Metoclopramide 10mg

TDS x 5/7 · Oral/IV · POM · Antiemetic for nausea; use cautiously — hepatic impairment slows metoclopramide clearance (HEPATIC IMPAIRMENT SKILL: reduce dose or use ondansetron 4mg instead in severe impairment)

RX REQUIRED **Ursodeoxycholic acid 500mg**

BD (off-label hepatoprotective) · Oral · POM — physician decision · Evidence limited but used in DILI supportive care; discontinue if LFTs worsen

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Strict alcohol cessation mandatory — alcohol is a major independent hepatotoxin that compounds DILI

— High-calorie soft diet to maintain nutritional state

— Avoid herbal medicines and traditional remedies (many are hepatotoxic)

NON-PHARMACOLOGICAL

— Immediate referral to hospital for LFT monitoring

— Bed rest

— Strict alcohol abstinence

— Serial clinical assessment of jaundice depth

— Weekly LFT until normalisation

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— IMMEDIATE referral to TB specialist / hepatologist

— Notify TB programme officer — treatment interruption must be formally documented

— Sequential rechallenge protocol initiated only by physician after LFT normalisation (typically: total bilirubin <2x ULN and ALT <3x ULN)

FOLLOW-UP PLAN

— Serial LFT every 3-7 days until normalisation; HBsAg and anti-HCV serology; abdominal USS; alcohol cessation counselling

X INTERACTION SCREEN

GROUP A — NEW × NEW

No Group A interactions applicable (all RHZE STOPPED — no new medications being combined today)

GROUP B — NEW × EXISTING

Metoclopramide x Hepatic impairment: CLINICALLY SIGNIFICANT — hepatic impairment markedly reduces metoclopramide clearance; accumulation risk; extra-pyramidal side effects; consider ondansetron 4mg as safer alternative in severe impairment · severity: high

GROUP C — RESIDUAL / DELAYED

Residual rifampicin CYP450 induction persists for 2-4 weeks after stopping — any new drug started during this window may have unpredictably reduced plasma levels; flag to prescriber for any new medication initiated

DRUG-DISEASE FLAGS

Active TB + Liver dysfunction: all four RHZE drugs are hepatotoxic at varying degrees (pyrazinamide > rifampicin > isoniazid > ethambutol); jaundice is a mandatory STOP trigger per FMOH protocol

Alcohol use + DILI: independent hepatotoxin — amplifies severity; strict abstinence required

CONTRAINDICATIONS

All ATT drugs: CONTRAINDICATED until LFTs normalise and rechallenge protocol initiated

NSAIDs: CONTRAINDICATED in hepatic impairment

Herbal remedies: CONTRAINDICATED

XI DISPENSING DECISION

RHZE: HOLD — do NOT dispense

Metoclopramide OR Ondansetron: DISPENSE (OTC/P for ondansetron POM for IV) — with hepatic dose caution

IV fluids: ADMINISTER in hospital

Ursodeoxycholic acid: HOLD pending physician authorisation

CLINICAL SYNTHESIS

Anti-TB DILI. All four drugs stopped immediately per FMOH NTP protocol. Alcohol is a compounding hepatotoxin — mandatory cessation. Residual CYP450 induction from rifampicin persists 2-4 weeks — alert prescribers to drug interaction risk window. Sequential rechallenge after LFT normalisation.

GUIDELINES FMOH National Tuberculosis and Leprosy Control Programme (NTBLCP) Guidelines 2022 | FMOH STG 6th edition | WHO TB Treatment Guidelines 2022

CASE STUDY

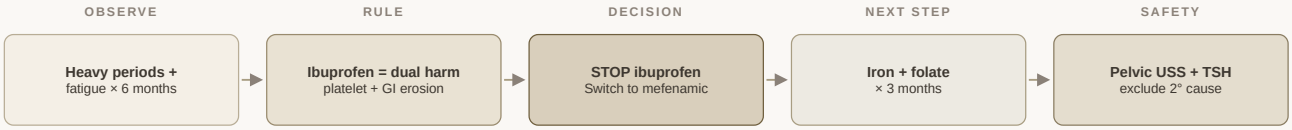
PT012

48-year-old female

IMPORTANT SAFE TO DISPENSE

after ibuprofen stopped

DECISION TRAIL



I PRESENTATION

> *Fatigue | dizziness | palpitations | heavy painful periods x 6 months; 'passing clots'*

BP 108/66 mmHg · HR 96 bpm · RR 16 brpm · Temp 36.8C · SpO2 98% · Wt 60 kg

II PATIENT CONTEXT

COMORBIDITIES	*None reported*
CURRENT MEDS	Ibuprofen 400mg TDS (self-prescribed OTC for menstrual cramps)
ALLERGIES	*No known allergies*

III TARGETED HISTORY

How many periods per year?

→ *Regular — every month*

Any blood between periods?

→ No

Diet — meat and vegetables?

→ *Mostly starchy food; little red meat*

Any previous anaemia diagnosis?

→ No

IV CLARIFYING QUESTION

> *On your heaviest day of menstrual bleeding how many sanitary pads do you fully soak through — and do you also pass clots larger than a 50-naira coin?*

V DIFFERENTIAL DIAGNOSIS

#1 Iron deficiency anaemia secondary to chronic menorrhagia — **80%**

ICD-10 · D50.0

Fatigue + dizziness + palpitations + heavy periods x 6 months; low-meat diet; BP 108/66 suggests haemodynamic effect; NSAID-induced GI blood loss compounding

#2 **Hypothyroidism contributing to menorrhagia** 12%

ICD-10 · E03.9

Hypothyroidism causes menorrhagia and fatigue independently; TSH required to exclude

#3 **Uterine pathology (fibroids or polyps) causing menorrhagia** 8%

ICD-10 · D25.9

Clot passage in a 48-year-old warrants pelvic USS to exclude fibroids or endometrial polyps

VI CLINICAL REASONING

IDA secondary to menorrhagia in a perimenopausal woman on self-prescribed ibuprofen. Ibuprofen has dual harm: (1) inhibits platelet aggregation worsening menstrual blood loss; (2) causes GI mucosal erosion contributing to occult blood loss. STOP ibuprofen immediately and switch to mefenamic acid for dysmenorrhoea (prostaglandin inhibitor with proven menorrhagia benefit). Iron supplementation TDS for rapid repletion. Folic acid co-supplementation for haematopoiesis. Pelvic USS and FBC urgently. Gynaecology referral if no haematological response at 3 months.

VII PHARMACOTHERAPY

STOP **Ibuprofen 400mg TDS — IMMEDIATELY**

Ibuprofen worsens menstrual blood loss (anti-platelet) and causes GI mucosal erosion · Switch to mefenamic acid for dysmenorrhoea

Ferrous sulphate 200mg

TDS (between meals for maximum absorption) x minimum 3/12 · Oral · OTC/P · Iron repletion for IDA; counsel stools will darken; take with citrus juice (vitamin C) to enhance absorption; avoid with tea/coffee/dairy · Guideline: NEML 2020 §6.1

Folic acid 5mg

OD x 3/12 · Oral · OTC · Co-supplementation to support haematopoiesis; particularly important in reproductive-age women · Guideline: NEML 2020 §6.1

Mefenamic acid 500mg

TDS during menstruation only (start day 1 of period) · Oral · POM/P · Prostaglandin inhibitor — reduces both menstrual pain AND blood flow (unlike ibuprofen which increases blood loss via platelet inhibition); superior for menorrhagia · Guideline: NEML 2020 §4.8

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Increase dietary iron: red meat

— dark leafy vegetables (ugwu/ugu

— spinach)

— beans and lentils

— Vitamin C-rich foods with iron meals to enhance absorption

— Avoid tea and coffee within 2h of iron tablet

NON-PHARMACOLOGICAL

— Rest during heaviest flow days

— Avoid excessive physical exertion until Hb recovers

— Menstrual cup counselling as option

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— Gynaecology referral if: no haematological improvement (rising Hb) at 3 months

— clots passage continues

— pelvic USS shows fibroids or polyps requiring intervention

— Hb below 7 g/dL at baseline (consider IV iron or transfusion)

FOLLOW-UP PLAN

— FBC and iron studies (serum ferritin

— transferrin saturation

— MCV) at baseline and at 1 month; TSH to exclude hypothyroidism; pelvic USS for structural uterine pathology; recheck Hb at 3 months

X INTERACTION SCREEN

GROUP A — NEW × NEW

Ferrous sulphate x Folic acid: no pharmacokinetic antagonism; both required for haematopoiesis · BENEFICIAL COMBINATION

Ferrous sulphate x Mefenamic acid: GI mucosal irritation from mefenamic acid may reduce iron absorption slightly — advise 2h separation · LOW SEVERITY

GROUP B — NEW × EXISTING

Ferrous sulphate x Ibuprofen (patient's prior OTC): STOP ibuprofen — GI mucosal damage compounded by iron tablet irritation; combined risk of GI bleeding elevated · severity: HIGH — STOP ORDER

Mefenamic acid x Ibuprofen: DO NOT COMBINE — dual NSAID therapy; mefenamic acid replaces ibuprofen entirely · severity: HIGH

GROUP C — RESIDUAL / DELAYED

None from prior consultations

DRUG-DISEASE FLAGS

IDA + Ibuprofen: ibuprofen is counter-therapeutic in menorrhagia-driven IDA — inhibits platelets and causes GI blood loss; STOP order confirmed

IDA + Mefenamic acid: safe substitution — mefenamic acid reduces prostaglandin-driven menstrual flow and blood loss unlike ibuprofen

CONTRAINDICATIONS

Ibuprofen: CONTRAINDICATED in this patient context — worsens menstrual blood loss and compounds GI iron loss

NSAIDs in general: use with caution in IDA; mefenamic acid is the exception with proven anti-menorrhagic benefit

XI DISPENSING DECISION

Ferrous sulphate 200mg TDS: DISPENSE (OTC/P) — counsel between-meal timing and citrus co-ingestion

Folic acid 5mg OD: DISPENSE (OTC) — safe and beneficial

Mefenamic acid 500mg TDS during menses: DISPENSE (POM/P) — replaces ibuprofen; counsel GI side effects

Ibuprofen: COUNSEL TO STOP — do not dispense further

CLINICAL SYNTHESIS

IDA secondary to menorrhagia + NSAID-compounded GI loss in perimenopausal woman. Ibuprofen stopped immediately. Mefenamic acid substituted — superior for menorrhagia. Ferrous sulphate TDS minimum 3 months. Gynaecology referral if structural cause identified on USS.

GUIDELINES NEML 2020 | FMOH STG 6th edition (Haematology) | FIGO 2022 Menorrhagia Guidelines

CASE STUDY

PT013

50-year-old male

CRITICAL SAFE TO DISPENSE

pending hospital transfer — acute medications initiated immediately

DECISION TRAIL

I PRESENTATION

> *Crushing central chest pain | radiating to left arm | diaphoresis | nausea x 90 minutes; onset at rest*

BP 158/96 mmHg · HR 108 bpm · RR 22 brpm · Temp 37.0C · SpO2 95% · Wt 82 kg

II PATIENT CONTEXT

COMORBIDITIES

- CKD stage 3 (eGFR 38 mL/min/1.73m2)
- Essential Hypertension

CURRENT MEDS

- Lisinopril 5mg OD
- Amlodipine 5mg OD
- Aspirin 75mg OD (pre-existing cardiovascular prophylaxis)

ALLERGIES

No known allergies

III TARGETED HISTORY

Is the pain constant or does it come and go?

→ *Constant — has not eased*

Any similar episode before?

→ *Yes — mild episode 3 months ago that resolved*

Any shortness of breath?

→ *Yes — mild*

ECG available?

→ *Not yet ordered*

IV CLARIFYING QUESTION

> *Is the chest pain present at rest or does it only come on with physical exertion — and does it radiate to your arm jaw or neck?*

V DIFFERENTIAL DIAGNOSIS

#1 Acute Coronary Syndrome (NSTEMI/UA) — 78%

ICD-10 · I21.4

Central crushing chest pain radiating to left arm + diaphoresis + nausea at rest x 90 min; prior similar episode; SpO2 95%; hypertensive; ECG urgently required

#2 Stable angina with hypertensive urgency — 14%

ICD-10 · I20.0

Hypertension driving demand ischaemia; less likely given rest-onset and radiation pattern but must exclude

#3 Aortic dissection — 8%

ICD-10 · I71.0

Severe BP and radiation to arm; however tearing character and pulse differential not yet assessed — must exclude

VI CLINICAL REASONING

High-probability ACS in a 50-year-old hypertensive male with CKD stage 3. Rest-onset central chest pain with arm radiation and diaphoresis for 90 minutes meets FMOH ACS criteria for emergency management. CKD stage 3 modifies dosing: morphine dose reduced (renal clearance impaired); ACEi temporarily reconsidered in acute setting. Loading dose aspirin given even though 75mg was already taken this morning. Clopidogrel loading per FMOH ACS protocol. Immediate hospital transfer with emergency team.

VII PHARMACOTHERAPY

Aspirin 300mg STAT loading dose

Single dose now · Oral (chewed for rapid absorption) · OTC · Loading on top of existing 75mg/day; chew immediately — do NOT swallow whole · Guideline: FMOH STG ACS / ESC 2023 NSTEMI Guidelines

Clopidogrel 300mg STAT loading dose

Single dose now · Oral · POM · Dual antiplatelet therapy per ACS protocol; 300mg loading followed by 75mg OD maintenance; CKD does not require dose adjustment · Guideline: FMOH STG ACS

Morphine sulphate 2.5mg IV (DOSE REDUCED for CKD eGFR 38 — standard 5mg reduced by 50%)

Titrate slowly · IV · POM · Analgesic and anxiolytic for ACS pain; CKD slows morphine-6-glucuronide clearance — risk of respiratory depression at standard doses · Guideline: NEML 2020 §4.7 / BNF CKD dosing

Atorvastatin 40mg

OD · Oral · POM · High-intensity statin for ACS regardless of baseline cholesterol; CKD does not require dose reduction for atorvastatin · Guideline: FMOH STG / ESC Lipid Guidelines 2021

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Sublingual GTN 400mcg spray if available for immediate pain relief pending hospital transfer; supplemental O2 if SpO2 <94%

NON-PHARMACOLOGICAL

— Immediate hospital admission — this is an emergency; ECG, cardiac troponin, FBC, U&E, creatinine, glucose, CXR must be obtained on arrival; 12-lead ECG NOW; resuscitation equipment on standby

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— Immediate emergency hospital transfer (secondary or tertiary facility) — do NOT manage ACS at pharmacy level; call ambulance

FOLLOW-UP PLAN

— Cardiology follow-up within 24h; review ACEi (Lisinopril — temporarily hold if SBP falls below 100 during acute phase); repeat creatinine at 48h to assess CKD impact of haemodynamic event

X INTERACTION SCREEN

GROUP A — NEW × NEW

Aspirin x Clopidogrel: INTENDED dual antiplatelet combination for ACS — standard of care; GI bleeding risk acknowledged and acceptable in this context; add PPI (omeprazole 20mg OD) on discharge · severity: LOW (intentional)

Clopidogrel x Atorvastatin: no clinically significant interaction at these doses · SAFE

Morphine x Aspirin: no pharmacodynamic antagonism · SAFE

GROUP B — NEW × EXISTING

Morphine x CKD (Lisinopril context): Lisinopril reduces angiotensin II-driven renal perfusion — in acute haemodynamic compromise this may worsen AKI on CKD; HOLD Lisinopril if SBP falls below 100 · severity: MODERATE

Clopidogrel x Amlodipine: no significant pharmacokinetic interaction · SAFE

Atorvastatin x Amlodipine: theoretical CYP3A4 interaction (both substrates) — amlodipine mildly increases

atorvastatin exposure; no dose adjustment required at 40mg · LOW SEVERITY

GROUP C — RESIDUAL / DELAYED

None flagged from prior visits

DRUG-DISEASE FLAGS

CKD3 + Morphine: active metabolite morphine-6-glucuronide accumulates in renal impairment — dose reduced to 2.5mg; monitor respiratory rate and conscious level

CKD3 + Lisinopril: ACEi + haemodynamic compromise = acute renal vasoconstriction risk; temporarily hold if haemodynamically unstable

CKD3 + Aspirin/Clopidogrel: dual antiplatelet therapy acceptable in ACS — benefit outweighs GI/renal bleeding risk in this acute context

CONTRAINDICATIONS

NSAIDs: CONTRAINDICATED in CKD3 (nephrotoxic)

Metformin: CONTRAINDICATED in CKD3 eGFR <45 (not prescribed here — flag for future)

ACEi (Lisinopril): hold if SBP <100 in acute phase

XI DISPENSING DECISION

Aspirin 300mg loading: DISPENSE (OTC) — chew immediately

Clopidogrel 300mg loading: DISPENSE (POM) — prescriber signature required

Morphine 2.5mg IV: ADMINISTER (POM) — hospital/emergency only

Atorvastatin 40mg OD: DISPENSE (POM) — start tonight

Lisinopril: CONTINUE with monitoring (hold if SBP <100)

CLINICAL SYNTHESIS

Probable ACS in CKD3 hypertensive. Dual antiplatelet loading initiated. Morphine halved for renal safety. Lisinopril review in acute phase. Emergency hospital transfer arranged. Do not delay revascularisation assessment.

GUIDELINES NEML 2020 | FMOH STG 6th edition (Cardiovascular) | ESC NSTEMI Guidelines 2023 | Nigerian Cardiac Society

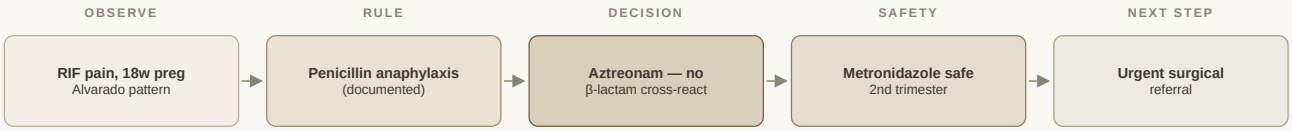
CASE STUDY

PT014

28-year-old female · pregnant

CRITICAL SAFE TO DISPENSE

DECISION TRAIL



I PRESENTATION

> *Right lower abdominal pain | nausea | low-grade fever x 24 hours; pain initially around umbilicus then migrated to right lower quadrant*

BP 106/70 mmHg · HR 118 bpm · RR 22 brpm · Temp 38.3C · SpO2 97% · Wt 66 kg

II PATIENT CONTEXT

COMORBIDITIES

- Pregnancy 18 weeks (2nd trimester)
- Penicillin anaphylaxis (documented — prior anaphylaxis requiring adrenaline)

CURRENT MEDS

- Folic acid 5mg OD
- Ferrous sulphate 200mg BD

ALLERGIES

Penicillin — documented anaphylaxis (documented in medical notes)

III TARGETED HISTORY

Where exactly did the pain start?

→ *Around my belly button — then moved down to the right lower side over 12 hours*

Any vomiting?

→ *Yes — twice*

Bowel movements?

→ *None in 2 days*

IV CLARIFYING QUESTION

> *Did the pain start around your belly button and then shift to the lower right side of your abdomen over the course of 12-24 hours?*

V DIFFERENTIAL DIAGNOSIS

#1 Acute appendicitis — 82%

ICD-10 · K37

Classic Alvarado: umbilico-RIF migration + nausea + vomiting + fever + tachycardia + RLQ guarding in 2nd trimester (appendix displaced superiorly); Alvarado score 7-8 | HIGH RISK

#2 Ovarian torsion (right ovary) — 10%

ICD-10 · N83.5

Acute right-sided pain in pregnancy; however classic migration pattern and fever less consistent with torsion

#3 Pyelonephritis (right-sided) — 8%

ICD-10 · N10

Fever + tachycardia + flank component; however RLQ localisation after umbilical start is more appendicitis pattern

VI CLINICAL REASONING

High-probability acute appendicitis in a 2nd-trimester pregnancy. The classic Alvarado migratory pain pattern (periumbilical to RLQ) is preserved at 18 weeks. Elevated HR 118 + temp 38.3C in a pregnant patient constitutes systemic response — sepsis rule-out urgently required. CRITICAL ALLERGY FLAG: penicillin anaphylaxis excludes all beta-lactams with significant cross-reactivity. Aztreonam (monobactam) has NO cross-reactivity with penicillins and is safe in documented penicillin anaphylaxis. Metronidazole is safe in 2nd trimester (first-trimester teratogenicity concern does not apply at 18 weeks). NSAIDs strictly contraindicated in pregnancy. Surgical consult STAT — perforation risk.

VII PHARMACOTHERAPY

IV Aztreonam 1g

TDS x 5-7/7 · IV · POM · SAFE IN PENICILLIN ANAPHYLAXIS — aztreonam is a monobactam; no cross-reactivity with penicillin or cephalosporins; covers gram-negative organisms including E. coli; surgical prophylaxis and peri-operative coverage · Guideline: NEML 2020 §9 / Allergy UK Penicillin Allergy Cross-Reactivity Guidelines

IV Metronidazole 500mg

TDS x 5-7/7 · IV · POM · Anaerobic coverage (Bacteroides spp.); SAFE in 2nd trimester — teratogenicity risk is 1st trimester only; essential for appendiceal flora coverage · Guideline: NEML 2020 §9 / FMOH Obstetric STG

Paracetamol 1g

TDS-QDS · IV/Oral · OTC/P · Only safe analgesic in pregnancy at standard doses; NSAIDs absolutely contraindicated (premature ductal closure risk and prostaglandin inhibition) · Guideline: NEML 2020 §4.7

CONTINUE

Folic acid 5mg OD

Continue Ferrous sulphate 200mg BD · Both safe and required throughout pregnancy — do not stop during acute illness

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

- Nil by mouth (NBM) if surgical intervention imminent
- IV fluid hydration (0.9% NaCl or Hartmann)
- Foetal monitoring initiated

NON-PHARMACOLOGICAL

- Absolute bed rest; NBM pending surgical review; continuous foetal heart rate monitoring; obstetric team co-management; cardiotocography (CTG) if gestation allows

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

- IMMEDIATE surgical referral and obstetric co-management — this is a surgical emergency; delay increases perforation and foetal loss risk; laparoscopic or open appendicectomy decision by surgeon; obstetric team must be present

FOLLOW-UP PLAN

- Post-operative: continue IV antibiotics x 5/7 minimum; restart oral folic acid and ferrous sulphate day 1 post-op; foetal well-being scan at 48h post-op; anaemia screen at 1 week post-op

X INTERACTION SCREEN

GROUP A — NEW × NEW

Aztreonam x Metronidazole: no significant pharmacokinetic interaction; complementary anaerobic + gram-negative coverage · SAFE

Aztreonam x Paracetamol: no interaction · SAFE

GROUP B — NEW × EXISTING

Aztreonam x Ferrous sulphate: no interaction · SAFE

Metronidazole x Folic acid: no clinically significant interaction · SAFE

Paracetamol x Ferrous sulphate: no interaction · SAFE

GROUP C — RESIDUAL / DELAYED

None from prior consultations

DRUG-DISEASE FLAGS

Pregnancy 18 weeks + NSAIDs: ABSOLUTELY CONTRAINDICATED — prostaglandin inhibition causes premature ductus arteriosus constriction and oligohydramnios

Pregnancy + Metronidazole: SAFE at 18 weeks (2nd trimester); only 1st-trimester use is cautioned

Pregnancy + Paracetamol: SAFE at standard doses

CONTRAINDICATIONS

Penicillin group: ABSOLUTELY CONTRAINDICATED (anaphylaxis)

Cephalosporins: AVOID (cross-reactivity risk)

NSAIDs (ibuprofen | diclofenac | naproxen): ABSOLUTELY CONTRAINDICATED in pregnancy

Doxycycline: CONTRAINDICATED in pregnancy (foetal bone/tooth development)

XI DISPENSING DECISION

IV Aztreonam 1g TDS: ADMINISTER (POM) — hospital setting; confirm allergy alert bracelet in place

IV Metronidazole 500mg TDS: ADMINISTER (POM) — 2nd trimester safe

Paracetamol 1g TDS: DISPENSE (OTC) — only safe analgesic

Folic acid + Ferrous sulphate: CONTINUE — essential in pregnancy

CLINICAL SYNTHESIS

Acute appendicitis at 18 weeks in a patient with documented penicillin anaphylaxis. Aztreonam (monobactam) — safe, no cross-reactivity. Metronidazole — safe in 2nd trimester. All penicillins and cephalosporins excluded. NSAIDs absolutely contraindicated in pregnancy. Emergency surgical referral with obstetric co-management.

GUIDELINES NEML 2020 | FMOH Obstetric STG 6th edition | Allergy UK Penicillin Cross-Reactivity Guidelines | RCOG Green-top Guideline (Non-obstetric surgery in pregnancy)

CASE STUDY

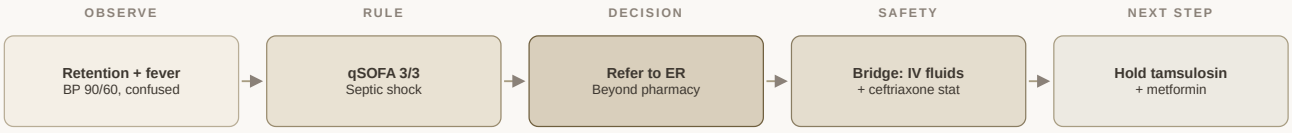
PT015

65-year-old male

REFER DO NOT DISPENSE

patient requires emergency hospital management — pharmacy cannot safely manage septic shock

DECISION TRAIL



I PRESENTATION

Severe suprapubic pain | inability to pass urine x 12 hours | fever | shivering | confusion (new onset)

BP 90/58 mmHg · HR 122 bpm · RR 24 brpm · Temp 39.2C · SpO2 94% · Wt 78 kg

II PATIENT CONTEXT

COMORBIDITIES

- Type 2 Diabetes Mellitus
- Benign Prostatic Hyperplasia
- Hypertension

CURRENT MEDS

- Metformin 500mg BD
- Glibenclamide 5mg OD
- Tamsulosin 400mcg OD

- Amlodipine 5mg OD

ALLERGIES *No known allergies*

III TARGETED HISTORY

Any urine output in last 12 hours?

→ *Almost none — just drops*

Feeling confused?

→ *Yes — family noticed he is not himself*

Pain on urination before today?

→ *Yes — burning for 3 days*

IV CLARIFYING QUESTION

> *CONCLUDE_AND_REFER: Blood pressure is critically low at 90/58 mmHg with signs of urosepsis (fever 39.2°C | heart rate 122 | confusion | SpO2 94%). This patient requires IMMEDIATE transfer to a hospital emergency department by ambulance. Do not administer oral medications. Insert urinary catheter if trained. Start IV access and 0.9% NaCl immediately. Call emergency services NOW. Alert the receiving hospital.*

V DIFFERENTIAL DIAGNOSIS

#1 Urosepsis (septic shock from urinary source — likely complicated UTI with BPH-related retention) — 80%

ICD-10 · A41.51

BP 90/58 + HR 122 + Temp 39.2C + RR 24 + confusion = SOFA criteria met; urinary source strongly implicated; BPH-driven retention is nidus

#2 Acute urinary retention with systemic infection — 15%

ICD-10 · R33

BPH + inability to void + suprapubic pain; infection likely ascending from stagnant urine; sepsis developing

#3 Diabetic ketoacidosis (DKA) with concurrent infection — 5%

ICD-10 · E11.10

T2DM + confusion + tachypnoea; however suprapubic localisation and urinary history point primarily to urosepsis

VI CLINICAL REASONING

DANGER SIGN CONFIRMED: BP 90/58 mmHg is below the FMOH shock threshold (systolic <90 mmHg) in a febrile tachycardic confused patient. qSOFA score 3/3 (confusion + RR >22 + SBP <100). This is septic shock from a urinary source — urosepsis. Immediate IV access and fluid resuscitation required. Do not delay transfer for investigations. Tamsulosin must be held — additive hypotension in septic shock is lethal. Metformin held — lactic acidosis risk in shock. Urinary catheterisation (if trained) to relieve retention and drain infected urine.

VII PHARMACOTHERAPY

IV 0.9% NaCl 500mL STAT (sepsis resuscitation bolus)

Repeat as needed targeting SBP >90 mmHg · IV · POM · Immediate fluid resuscitation for septic shock; do NOT use hypotonic fluids · Guideline: FMOH STG 6th edition / Surviving Sepsis Campaign 2021

IV Ceftriaxone 2g STAT (empiric — do NOT delay for culture results)

OD · IV · POM · Broad-spectrum empiric coverage for gram-negative urosepsis; 2g dose in sepsis (higher than standard 1g) · Guideline: NEML 2020 §9.1 / FMOH STG Urology

HOLD RX REQUIRED

Metformin 500mg BD — IMMEDIATELY

Oral (held) · POM · Absolute risk of lactic acidosis in septic shock with haemodynamic compromise; do not restart until haemodynamically stable and creatinine normalised

HOLD RX REQUIRED

Tamsulosin 400mcg OD — IMMEDIATELY

Oral (held) · POM · Alpha-blocker causes vasodilation and hypotension; in septic shock this is LETHAL — additive profound hypotension

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

- IV glucose monitoring (BG every 2h — glibenclamide risk of hypoglycaemia in shock and reduced oral intake); nil by mouth (NBM) pending hospital stabilisation

NON-PHARMACOLOGICAL

- Urinary catheterisation immediately by trained personnel (relieve obstruction and drain infected urine); oxygen supplementation (target SpO2 >94%); resuscitation position (flat or Trendelenburg); IV access (wide-bore x2)

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

FOLLOW-UP PLAN

— IMMEDIATE emergency hospital transfer — call ambulance NOW; this patient may deteriorate to cardiac arrest if transfer delayed; alert receiving emergency department to expect septic shock

— Hospital: blood cultures x2 before antibiotics (do not delay antibiotics for culture); urine MC&S via catheter; FBC

— U&E

— lactate

— ABG; ICU or HDU admission; vasopressors if BP does not respond to fluids

X INTERACTION SCREEN

GROUP A — NEW × NEW

IV 0.9% NaCl x Ceftriaxone: standard co-administration for IV antibiotic delivery

SAFE — administer ceftriaxone in 0.9% NaCl 100mL over 30 min

GROUP B — NEW × EXISTING

Ceftriaxone x Tamsulosin: Tamsulosin is HELD — interaction moot; if both were active: ADDITIVE HYPOTENSION risk (ceftriaxone does not cause hypotension directly but tamsulosin alpha-blockade compounded by septic vasodilation is lethal)

Ceftriaxone x Glibenclamide: HOLD glibenclamide — hypoglycaemia risk in septic shock with reduced oral intake; IV glucose monitoring required

Ceftriaxone x Amlodipine: Amlodipine vasodilator effect compounded by septic vasodilation — hold if SBP remains <90 after fluids

GROUP C — RESIDUAL / DELAYED

None from prior visits

DRUG-DISEASE FLAGS

Septic shock + Tamsulosin: ABSOLUTELY CONTRAINDICATED during hypotensive sepsis — alpha-blockade + septic vasodilation = refractory hypotension

Septic shock + Metformin: ABSOLUTELY CONTRAINDICATED — lactic acidosis in haemodynamically compromised state

Septic shock + Glibenclamide: hypoglycaemia risk — hold oral agents; use insulin sliding scale in hospital

CKD risk in sepsis: monitor creatinine closely as renal perfusion may be compromised

CONTRAINDICATIONS

Tamsulosin: HOLD — CONTRAINDICATED in septic hypotension

Metformin: HOLD — CONTRAINDICATED

Oral antihyperglycaemic agents: HOLD all oral agents in septic shock; switch to insulin in hospital

NSAIDs: ABSOLUTELY CONTRAINDICATED in septic shock (nephrotoxic + worsens haemodynamics)

XI DISPENSING DECISION

IV 0.9% NaCl 500mL STAT: ADMINISTER immediately

IV Ceftriaxone 2g STAT: ADMINISTER — do not wait for culture

Metformin: HOLD — do NOT dispense

Tamsulosin: HOLD — do NOT dispense

Glibenclamide: HOLD oral — monitor BG only

CLINICAL SYNTHESIS

UROSEPSIS — SEPTIC SHOCK. CONCLUDE_AND_REFER activated. qSOFA 3/3. Tamsulosin and Metformin held immediately. IV fluids and empiric ceftriaxone initiated at pharmacy while awaiting ambulance. Do not delay transfer.

GUIDELINES FMOH STG 6th edition (Emergency Medicine) | Surviving Sepsis Campaign 2021 | NEML 2020

CASE STUDY

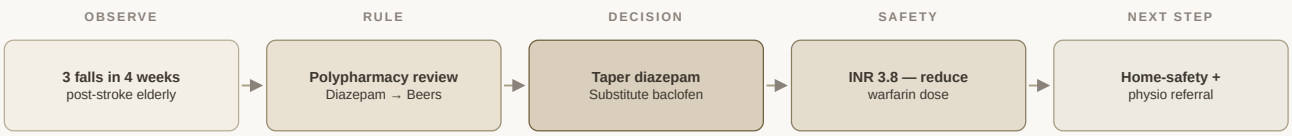
PT016

68-year-old female

IMPORTANT SAFE TO DISPENSE

with dose adjustments and taper schedule — safe to dispense with careful counselling

DECISION TRAIL



I PRESENTATION

> *Three falls in 4 weeks | increasing confusion | difficulty walking (worsening from baseline)*

BP 148/88 mmHg · HR 78 bpm (irregularly irregular) · RR 16 brpm · Temp 36.9C · SpO2 97% · Wt 65 kg

II PATIENT CONTEXT

COMORBIDITIES

- Post-ischaemic stroke (6 months ago with residual left hemiparesis)
- Atrial Fibrillation
- Hypertension
- Spasticity

CURRENT MEDS

- Warfarin 5mg OD
- Atorvastatin 40mg OD
- Amlodipine 10mg OD
- Diazepam 5mg TDS (for spasticity)
- Lisinopril 10mg OD
- Aspirin 75mg OD

ALLERGIES

No known allergies

III TARGETED HISTORY

When were you started on diazepam?

→ *4 months ago*

Has walking worsened since starting diazepam?

→ *Yes — family says she trips more*

Last INR?

→ *3.8 (6 weeks ago — supratherapeutic)*

Alcohol use?

→ *None*

IV CLARIFYING QUESTION

> *Did the falls start or noticeably increase after you were prescribed diazepam — and how many falls have you had in the past month?*

V DIFFERENTIAL DIAGNOSIS

#1 Diazepam-induced falls and increased confusion in elderly post-stroke patient — 72%

ICD-10 · T42.4 (ADVERSE EFFECT)

Temporal association: falls began 4 months ago coinciding with diazepam initiation; elderly post-stroke patients have markedly increased fall risk with benzodiazepines

#2 Supratherapeutic warfarin (INR 3.8) contributing to fall risk / intracranial bleed concern — 18%

ICD-10 · Z79.01

INR 3.8 is supratherapeutic (target 2-3 for AF); Warfarin + falls = high subdural haematoma risk in elderly stroke patient

#3 Worsening spasticity or recurrent TIA/stroke as primary pathology — 10%

ICD-10 · G81.1

New neurological symptoms post-stroke always require imaging exclusion; however polypharmacy aetiology more probable given temporal diazepam correlation

VI CLINICAL REASONING

Polypharmacy-driven falls in a post-stroke elderly patient. Diazepam is a class 1 Beers Criteria hazard in the elderly — sedation and muscle relaxation compound existing post-stroke hemiparesis and gait instability. Planned: taper and cease diazepam; substitute baclofen for spasticity (evidence-based anti-spastic without sedation). INR 3.8 requires warfarin dose reduction — supratherapeutic anticoagulation in a falling patient is a subdural haematoma risk. Amlodipine 10mg OD may contribute to orthostatic hypotension — consider dose reduction to 5mg. Aspirin + warfarin: dual antithrombotic strategy — review with cardiologist for AF stroke prevention re: whether aspirin is still required.

VII PHARMACOTHERAPY

RX REQUIRED **Diazepam TAPER AND CESSATION**

Reduce from 5mg TDS to 5mg BD x 1 week then 5mg OD x 1 week then 2.5mg OD x 1 week then STOP · POM — prescriber must sign taper schedule · Do NOT stop abruptly (withdrawal seizure risk in elderly) · Guideline: FMOH STG / Beers Criteria 2023

Baclofen 5mg

TDS (titrate up to 10mg TDS if tolerated over 2 weeks) · Oral · POM · GABA-B agonist anti-spastic — evidence-based for post-stroke spasticity; avoids CNS sedation of diazepam at standard doses; taper diazepam simultaneously · Guideline: NICE Clinical Guideline Spasticity CG145

RX REQUIRED **Warfarin — DOSE REDUCTION (from 5mg OD)**

Reduce to 3mg OD x 5 days then recheck INR (target 2.0-3.0 for AF) · POM — physician-directed dose adjustment · Falls risk at INR >3.5 is critical (subdural haematoma) · Guideline: NEML 2020 / BSH Warfarin Guidelines

RX REQUIRED

Amlodipine 10mg OD — CONSIDER DOSE REDUCTION to 5mg

Review with physician · Calcium channel blocker vasodilation may cause orthostatic hypotension contributing to falls · Guideline: FMOH STG Hypertension

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

- Fall-prevention environmental modifications: remove loose rugs and carpets
- install grab rails in bathroom
- non-slip footwear
- Use of walking aid (tripod stick or frame)

NON-PHARMACOLOGICAL

- Physiotherapy referral for post-stroke gait rehabilitation and spasticity management; Falls clinic referral; OT home assessment

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

- Urgent CT brain to exclude new stroke or subdural haematoma (INR 3.8 + 3 falls = high bleed risk)
- Neurology review for spasticity management
- Cardiology review: reconsider aspirin + warfarin dual therapy in AF (DOAC switch may be preferable in elderly)

FOLLOW-UP PLAN

- Urgent INR recheck in 5 days post-dose reduction; medication reconciliation — all medications reviewed for Beers Criteria hazards; family education on fall prevention

X INTERACTION SCREEN

GROUP A — NEW × NEW

Baclofen x Warfarin: no pharmacokinetic interaction; baclofen does not affect CYP2C9 · SAFE

Baclofen x Amlodipine: no significant interaction · SAFE

GROUP B — NEW × EXISTING

Baclofen x Diazepam (during taper overlap): MODERATE RISK — additive CNS depression; monitor sedation closely during taper; do NOT initiate baclofen at full dose until diazepam below 5mg OD · severity: MODERATE

Warfarin x Atorvastatin: CYP3A4-mediated interaction — atorvastatin mildly inhibits warfarin metabolism; INR already supratherapeutic; dose-reduce warfarin and recheck INR at 5 days · severity: MODERATE

Warfarin x Amlodipine: minor CYP3A4 interaction; monitor INR · severity: LOW

Aspirin x Warfarin: dual antithrombotic — significantly increases bleeding risk including intracranial; review with cardiologist whether aspirin is still indicated in AF (DOAC era: aspirin adds bleeding without added stroke prevention) · severity: HIGH

GROUP C — RESIDUAL / DELAYED

None from prior visits

DRUG-DISEASE FLAGS

Post-stroke elderly + Diazepam: Beers Criteria Class 1 — increased fall risk

sedation

cognitive impairment in elderly; TAPER AND STOP

Post-stroke + Supratherapeutic Warfarin (INR 3.8): subdural haematoma risk in a falling patient is CRITICAL

Amlodipine 10mg + Orthostatic hypotension: contributes to falls in elderly — dose reduce

Post-stroke + Aspirin + Warfarin: dual antithrombotic — high bleeding risk; specialist review required

CONTRAINDICATIONS

Diazepam: DEPRESCRIBE (taper schedule) — Beers Criteria hazard

Abrupt benzodiazepine cessation: CONTRAINDICATED (withdrawal seizure) — must taper

Aspirin + Warfarin: COMBINATION to be reviewed — bleeding risk may outweigh benefit in elderly AF

XI DISPENSING DECISION

Diazepam: taper schedule — dispense reduced doses per taper plan (POM)

Baclofen 5mg TDS: DISPENSE (POM) — start after first diazepam reduction

Warfarin 3mg OD: DISPENSE (POM) — reduced dose; INR recheck in 5 days mandatory

Amlodipine: REVIEW dose — physician decision

Atorvastatin: CONTINUE unchanged

CLINICAL SYNTHESIS

Polypharmacy falls in elderly post-stroke patient. Diazepam identified as primary driver (Beers Criteria). Taper 3 weeks. Baclofen substituted. Warfarin dose reduced (INR 3.8 supratherapeutic). Aspirin + warfarin combination to be reviewed by cardiologist. CT brain urgently required to exclude subdural haematoma.

GUIDELINES NEML 2020 | FMOH STG 6th edition | AGS Beers Criteria 2023 | NICE CG145 Spasticity | BSH Warfarin Guidelines

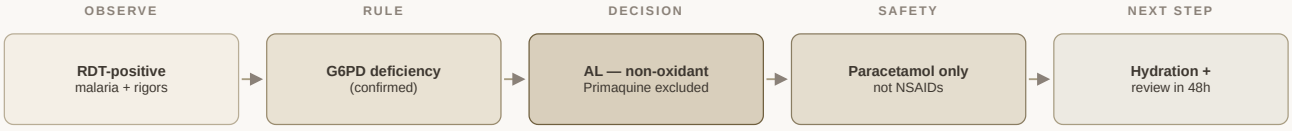
CASE STUDY

PT017

40-year-old male

IMPORTANT SAFE TO DISPENSE

DECISION TRAIL



I PRESENTATION

> *Fever | rigors | headache | nausea x 2 days; no vomiting; malaria RDT positive (done at pharmacy)*

BP 116/74 mmHg · HR 110 bpm · RR 18 brpm · Temp 39.6C · SpO2 98% · Wt 71 kg

II PATIENT CONTEXT

COMORBIDITIES
- G6PD deficiency (confirmed enzymatic assay)
- Sickle cell trait (HbAS genotype)

CURRENT MEDS Folic acid 5mg OD (sickle cell trait prophylaxis)

ALLERGIES G6PD deficiency — primaquine ABSOLUTELY contraindicated | quinine RELATIVELY contraindicated

III TARGETED HISTORY

Were you given any injection for malaria at another clinic recently?

→ No — *came directly here*

Any vomiting preventing tablets?

→ No — *I can swallow*

Eye colour now?

→ *Family says eyes look slightly yellow today*

IV CLARIFYING QUESTION

> *Were you given quinine injection or tablets for malaria at any other clinic or traditional healer before coming here today?*

V DIFFERENTIAL DIAGNOSIS

#1 Uncomplicated Plasmodium falciparum malaria — 85%

ICD-10 · B54

RDT positive; fever + rigors + headache x 2 days; SpO2 98%; no altered consciousness; no severe malaria features; malaria endemic zone (Nigeria)

#2 Viral syndrome with false-positive RDT — 10%

ICD-10 · B34.9

RDT false-positive rate is low but possible; clinical picture supports malaria; treat as malaria

#3 Haemolytic crisis from unidentified oxidant exposure (G6PD trigger) — 5%

ICD-10 · D55.0

Mild scleral icterus noted; G6PD-driven haemolysis can mimic malaria fever; however RDT positive — malaria more likely as primary; monitor Hb

VI CLINICAL REASONING

RDT-confirmed malaria in a G6PD-deficient patient with sickle cell trait. KEY G6PD RULING: Artemether-Lumefantrine (AL) is NOT an oxidant and does NOT cause haemolysis in G6PD deficiency — it is the standard FIRST-LINE treatment and is SAFE. Primaquine is ABSOLUTELY CONTRAINDICATED in G6PD deficiency (massive oxidant haemolysis risk). Quinine is relatively

contraindicated (mild oxidant risk — reserve for severe malaria only). Sickle cell trait (HbAS): pain crisis risk elevated by high fever — ensure adequate analgesia and hydration. Monitor for early severe malaria features.

VII PHARMACOTHERAPY

Artemether-Lumefantrine (AL) 80/480mg

Standard 6-dose regimen: 4 tabs at hour 0 · 4 tabs at hour 8 · 4 tabs BD x 2 further days (total 24 tablets) · Oral · POM · CONFIRMED SAFE IN G6PD DEFICIENCY — AL is not an oxidant; no haemolytic risk · Take with fatty food or milk to maximise lumefantrine absorption · Guideline: FMOH National Malaria Treatment Guidelines 2022 / WHO Malaria Treatment Guidelines 2023

Paracetamol 1g

QDS x 3/7 (for fever) · Oral · OTC/P · Safe in G6PD deficiency at standard doses; paracetamol is NOT an oxidant · AVOID ibuprofen/aspirin in G6PD — mild oxidant haemolysis risk · Guideline: NEML 2020 §4.7

CONTINUE

Folic acid 5mg OD

CONTINUE throughout malaria illness and recovery · Oral · OTC · Folate demand is increased during haemolytic episodes (even mild) in G6PD and sickle cell trait; do NOT stop

RX REQUIRED

PRIMAQUINE: ABSOLUTELY CONTRAINDICATED IN THIS PATIENT — G6PD deficiency; do not prescribe under any circumstances; haemolytic anaemia risk is life-threatening

flagged as absolute contraindication — isBlockedPendingPrescription: true (system hard block)

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Oral rehydration: 2-3L/day of water or ORS; encourage fluid intake even if nauseated — hydration critical in sickle cell trait to prevent sickling crisis during febrile illness

NON-PHARMACOLOGICAL

— Rest; tepid sponging for fever (do NOT use alcohol rubs — skin absorption oxidant risk in G6PD); mosquito net to prevent reinfection; return immediately if vomiting prevents AL intake or consciousness changes

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— Return to clinic urgently if: (1) vomiting prevents medication within 1h of dose (IV artesunate alternative required — SAFE in G6PD); (2) SpO2 falls below 94%; (3) confusion or convulsions (severe malaria)

FOLLOW-UP PLAN

— RDT recheck at day 3 (treatment response); FBC (baseline and day 3 to check for haemolysis); G6PD drug safety card issued to patient for all future consultations

— Follow-up day 3 for clinical response assessment

X INTERACTION SCREEN

GROUP A — NEW × NEW

Artemether-Lumefantrine x Paracetamol: no clinically significant interaction · SAFE

AL x Folic acid: no interaction · SAFE

GROUP B — NEW × EXISTING

AL x Folic acid: no interaction · SAFE

AL x QT prolongation: AL carries mild QT-prolonging potential (lumefantrine component); at therapeutic doses in non-cardiac patients this is a low clinical risk; however avoid co-prescribing other QT-prolonging drugs · severity: LOW (note only)

GROUP C — RESIDUAL / DELAYED

None flagged from prior visits

DRUG-DISEASE FLAGS

G6PD + AL: SAFE — confirmed; AL is not an oxidant

G6PD + Paracetamol: SAFE — not an oxidant

Sickle cell trait + Fever: increased sickling risk during high fever — ensure aggressive hydration and analgesia

G6PD + Folic acid: SAFE and beneficial — haemolytic stress increases folate demand

CONTRAINDICATIONS

Primaquine: ABSOLUTE CONTRAINDICATION — G6PD deficiency (system hard block)

Aspirin: AVOID — mild G6PD oxidant risk

Ibuprofen: AVOID — mild G6PD oxidant risk

XI DISPENSING DECISION

AL 80/480mg 6-dose course: DISPENSE (POM) — counsel on fatty food co-ingestion and strict adherence to 6-dose schedule

Paracetamol 1g QDS: DISPENSE (OTC/P) — safe; not aspirin

Folic acid 5mg OD: CONTINUE — do not stop

Primaquine: DO NOT DISPENSE — hard-blocked (G6PD contraindication)

CLINICAL SYNTHESIS

G6PD-deficient patient with RDT-confirmed uncomplicated malaria. AL is safe — not an oxidant. Primaquine absolutely excluded. Paracetamol for fever (not ibuprofen or aspirin). Hydration critical for sickle cell trait during fever. G6PD drug card issued.

GUIDELINES FMOH National Malaria Treatment Guidelines 2022 | WHO Malaria Treatment Guidelines 2023 | NEML 2020 | British Society for Haematology G6PD Guidelines

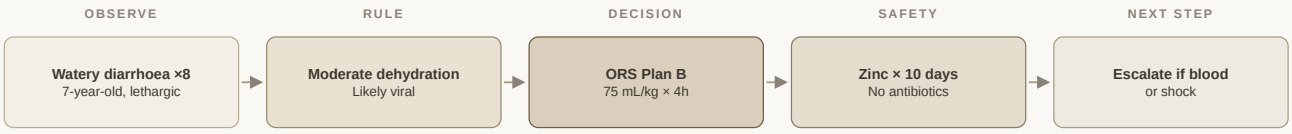
CASE STUDY

PT018

7-year-old male

CRITICAL SAFE TO DISPENSE

DECISION TRAIL



I PRESENTATION

Profuse watery diarrhoea (8 episodes in 24 hours) | vomiting x 4 | fever | reduced urination | lethargic

BP 96/60 mmHg · HR 122 bpm · RR 28 brpm · Temp 38.2C · SpO2 99% · Wt 24 kg

II PATIENT CONTEXT

COMORBIDITIES *None reported*

CURRENT MEDS *None reported*

ALLERGIES *No known allergies*

III TARGETED HISTORY

Any blood or mucus in the stool?

→ No — *just watery*

Last passed urine?

→ *About 6 hours ago*

Breastfed or bottlefed?

→ *No longer breastfeeding — taking family food*

Any vomiting of ORS attempted?

→ *Not tried yet*

IV CLARIFYING QUESTION

> *Is there any blood or dark mucus mixed in the stool — and what colour is the stool?*

V DIFFERENTIAL DIAGNOSIS

#1 Acute watery gastroenteritis with moderate dehydration (likely viral — rotavirus or adenovirus) — 78%

ICD-10 · A09

8 watery stools + 4 vomiting episodes + HR 122 + reduced urination + lethargy in 7-year-old; no blood in stool argues against dysentery; moderate dehydration assessment

#2 Bacterial gastroenteritis (Salmonella or E. coli) — 15%

ICD-10 · A02.0

Febrile gastroenteritis; however absence of blood/mucus makes typhoid and ETEC less likely; if stool culture or Widal available — check

#3 Cholera (Vibrio cholerae) — 7%

ICD-10 · A00.9

Profuse watery stool in Nigeria; however volume (8 episodes in 7-year-old) less extreme than rice-water cholera; no local outbreak flagged — viral remains most likely

VI CLINICAL REASONING

Moderate dehydration in a 7-year-old with acute watery gastroenteritis. No blood in stool — viral aetiology most probable (rotavirus peak age 6 months-5 years; adenovirus and norovirus through primary school age). CRITICAL paediatric assessment: HR 122 + lethargy + reduced urination = moderate dehydration requiring urgent ORS rehydration (WHO plan B: 75mL/kg over 4h). Zinc

reduces diarrhoea duration and recurrence per WHO/UNICEF joint statement. Antibiotics NOT indicated for viral watery gastroenteritis. If blood appears in stool — escalate to metronidazole ± cotrimoxazole for dysentery.

VII PHARMACOTHERAPY

ORS (oral rehydration solution — WHO low-osmolarity: 245 mOsm/L)

WHO Plan B: 900mL (75mL/kg x 12kg — using body weight fraction for 24kg child correction: approximately 75mL/kg = 1800mL over 4h) · After each stool: additional 200mL ORS · Oral · OTC · Critical — prevent severe dehydration; if vomiting occurs: give ORS in small sips (5mL every 2 min) · Guideline: WHO/UNICEF ORT Guidelines 2023 / FMOH IMNCI

Zinc sulphate 20mg

OD x 10/7 (WHO recommendation: 10 days even after diarrhoea stops — reduces recurrence by 25% and duration by 30%) · Oral (dispersible tablet or syrup) · OTC · Paediatric dose: 20mg for children >6 months; essential per WHO/UNICEF 2004 joint statement; crush and dissolve in small amount of ORS · Guideline: WHO/UNICEF Zinc Supplementation Guidelines

Paracetamol suspension 250mg/5mL — dose: 240mg (approximately 5mL at 250mg/5mL)

QDS PRN for fever >38°C · Oral · OTC · Dose calculated at 10mg/kg for 24kg child = 240mg; do NOT use aspirin or ibuprofen in acute gastroenteritis (risk of GI irritation + renal impairment with dehydration) · Guideline: NEML 2020 §4.7 Paediatric

NO ANTIBIOTICS

Viral gastroenteritis — antibiotics not indicated and may worsen prognosis (antibiotic-associated diarrhoea) · Escalate to metronidazole ONLY if blood or mucus appears in stool (dysentery)

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

- Continue age-appropriate feeding (do NOT starve — feeds should continue); breastfeed if still breastfeeding; avoid fruit juices and carbonated drinks (high osmolarity worsens diarrhoea); rice water
- banana
- boiled potato as easy carbohydrates

NON-PHARMACOLOGICAL

- Reassess hydration every 30 minutes during ORS rehydration: skin turgor
- eye appearance
- urine output; encourage rest; handwashing hygiene education for family

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

FOLLOW-UP PLAN

— IMMEDIATE referral to hospital if: (1) blood appears in stool (dysentery); (2) unable to retain ORS (persistent projectile vomiting); (3) lethargy worsens or child becomes unconscious; (4) signs of severe dehydration (sunken eyes

— absent tears

— skin pinch >2 seconds); (5) no urine output after 6h of ORS

— Reassess at 4h after commencing ORS (plan B completion); weigh child to confirm rehydration; if improved — transition to plan A (ORS after each stool at home); zinc for full 10 days; return in 24h if not improving

X INTERACTION SCREEN

GROUP A — NEW × NEW

ORS x Zinc sulphate: no pharmacokinetic interaction; zinc dissolves safely in ORS · SAFE

ORS x Paracetamol: no interaction · SAFE

GROUP B — NEW × EXISTING

No current medications to interact with · SAFE

GROUP C — RESIDUAL / DELAYED

None from prior visits

DRUG-DISEASE FLAGS

Dehydration + ORS: ORS is therapeutic for dehydration — no adverse drug-disease interactions

Dehydration + Paracetamol: paracetamol safe at weight-based dose even with mild renal compromise from dehydration; avoid ibuprofen (nephrotoxic with dehydration)

Dehydration + Ibuprofen: AVOID — nephrotoxic when dehydrated

Age 7 + Aspirin: CONTRAINDICATED (Reye syndrome risk)

CONTRAINDICATIONS

Aspirin: ABSOLUTELY CONTRAINDICATED in children with febrile viral illness (Reye syndrome)

Ibuprofen: AVOID in dehydration (nephrotoxic)

Antibiotics: NOT INDICATED for viral watery gastroenteritis

XI DISPENSING DECISION

ORS: DISPENSE (OTC) — counsel on preparation and sip-by-sip technique if vomiting

Zinc sulphate 20mg OD x 10/7: DISPENSE (OTC) — full 10-day course even after stools normalise

Paracetamol suspension 240mg QDS PRN: DISPENSE (OTC) — weight-based dose confirmed

Antibiotics: DO NOT DISPENSE

CLINICAL SYNTHESIS

Viral watery gastroenteritis with moderate dehydration in 7-year-old. ORS Plan B (75mL/kg x 4h) initiated. Zinc 20mg x 10 days. Paracetamol weight-based. No antibiotics. Escalate immediately if blood appears in stool or dehydration worsens.

GUIDELINES WHO/UNICEF ORT Guidelines 2023 | FMOH IMNCI (Integrated Management of Neonatal and Childhood Illness) | NEML 2020 Paediatric

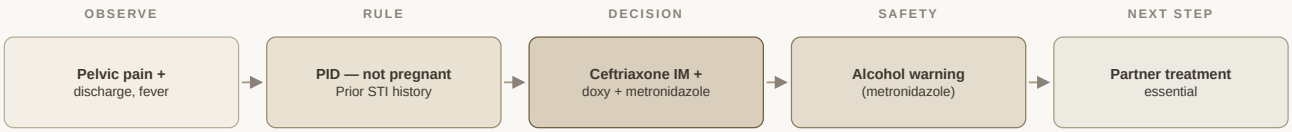
CASE STUDY

PT019

33-year-old female

CRITICAL SAFE TO DISPENSE

DECISION TRAIL



I PRESENTATION

Lower abdominal pain | abnormal vaginal discharge (yellow-green) | painful intercourse x 10 days; fever x 3 days

BP 122/78 mmHg · HR 94 bpm · RR 18 brpm · Temp 38.1C · SpO2 99% · Wt 58 kg

II PATIENT CONTEXT

COMORBIDITIES	*None reported*
CURRENT MEDS	*None reported*
ALLERGIES	*No known allergies*

III TARGETED HISTORY

Are you pregnant?

→ *No — LMP was 10 days ago*

Multiple sexual partners recently?

→ *Yes — new partner in last month*

Contraception?

→ *None currently*

Any previous STI?

→ *Chlamydia treated 2 years ago*

Deep pain during sex?

→ *Yes*

IV CLARIFYING QUESTION

> *Do you feel tenderness or pain when your cervix is gently moved during examination — and do you have deep pelvic pain during sexual intercourse?*

V DIFFERENTIAL DIAGNOSIS

#1 Pelvic Inflammatory Disease (PID) — 82%

ICD-10 · N73.0

Lower abdominal pain + purulent discharge + fever + dyspareunia x 10 days; new sexual partner + prior STI history; meets FMOH STG minimum clinical criteria for PID diagnosis and empiric treatment

#2 Acute appendicitis (right-sided pelvic presentation) — 10%

ICD-10 · K37

Right-sided pain possible; however bilateral presentation + discharge + STI history strongly favour PID over appendicitis

#3 Endometritis — 8%

ICD-10 · N71.0

Uterine source of infection possible in PID spectrum; treated empirically under same PID protocol

VI CLINICAL REASONING

High-probability PID based on clinical criteria (FMOH STG and CDC PID 2021): lower abdominal pain + mucopurulent discharge + fever + dyspareunia + prior STI history. PID diagnostic threshold deliberately low — under-treatment causes infertility via tubal scarring. Empiric triple therapy: ceftriaxone (Neisseria gonorrhoeae) + doxycycline (Chlamydia trachomatis) + metronidazole (anaerobes/bacterial vaginosis organisms). Patient confirmed NOT pregnant — doxycycline is SAFE. Alcohol must be strictly avoided for the 14-day metronidazole course (disulfiram-like reaction). Contact tracing and STI screen for partner is mandatory.

VII PHARMACOTHERAPY

Ceftriaxone 500mg IM STAT (single dose)

Intramuscular injection · POM · Covers Neisseria gonorrhoeae; superior to oral cephalosporins for gonorrhoea treatment in line with emerging resistance; single IM dose + oral step-down · Guideline: NEML 2020 §9.3 / CDC STI Treatment Guidelines 2021 / FMOH STG 6th edition

Doxycycline 100mg

BD x 14/7 · Oral · POM · Covers Chlamydia trachomatis and Mycoplasma genitalium; take with food (reduces GI side effects); CONFIRMED SAFE — patient is NOT pregnant (doxycycline is CONTRAINDICATED in pregnancy) · Guideline: NEML 2020 §9.3 / CDC PID Guidelines 2021

Metronidazole 400mg

BD x 14/7 · Oral · POM · Covers anaerobes and bacterial vaginosis organisms commonly co-infecting in PID; STRICT ALCOHOL PROHIBITION for 48h beyond last dose (disulfiram-like reaction) · Guideline: NEML 2020 §9.3

Paracetamol 1g

TDS PRN for pain and fever · Oral · OTC · Safe; avoid NSAIDs if renal function uncertain; ibuprofen may mask fever masking treatment response · Guideline: NEML 2020 §4.7

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Adequate hydration (2L/day); pelvic rest (abstain from sexual intercourse) for duration of 14-day treatment and until follow-up review confirms cure; light diet

NON-PHARMACOLOGICAL

— Pelvic rest mandatory during treatment; partner notification and treatment is essential (partner must be treated even if asymptomatic — treat as gonorrhoea + chlamydia regardless of test result)

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— Refer to gynaecologist or infectious disease specialist if: no clinical improvement after 72h of oral therapy (consider IV cefoxitin + doxycycline); tubo-ovarian abscess suspected on USS; peritonitis signs develop; HIV positive (increases PID severity)

FOLLOW-UP PLAN

— Review at 72h (clinical improvement expected — pain and fever should be reducing); full STI screen (HIV

— syphilis RPR

— hepatitis B); pelvic USS to exclude TOA; 14-day treatment completion check; partner treatment confirmation

X INTERACTION SCREEN

GROUP A — NEW × NEW

Doxycycline x Metronidazole: no significant pharmacokinetic interaction; complementary antibacterial spectrum in PID · SAFE

Ceftriaxone x Doxycycline: no interaction; complementary — ceftriaxone covers gonorrhoea (beta-lactam) while doxycycline covers intracellular organisms · SAFE

Ceftriaxone x Metronidazole: no significant interaction · SAFE

Ceftriaxone x Paracetamol: no interaction · SAFE

GROUP B — NEW × EXISTING

No current medications to interact with

GROUP C — RESIDUAL / DELAYED

None from prior consultations (chlamydia treated 2 years ago — doxycycline course completed)

DRUG-DISEASE FLAGS

PID + Doxycycline: confirmed NOT pregnant — doxycycline SAFE; counsel on photosensitivity (avoid strong sun exposure during treatment) and take with food to reduce GI upset

PID + Metronidazole: alcohol STRICTLY prohibited during and 48h after treatment — disulfiram-like reaction (flushing | palpitations | vomiting)

PID + Antacids/Dairy: doxycycline absorption is reduced by calcium-containing food and antacids — take 2h apart

CONTRAINDICATIONS

Doxycycline: CONTRAINDICATED in pregnancy (confirmed not pregnant — safe to prescribe here)

Alcohol: CONTRAINDICATED with metronidazole (disulfiram-like reaction) — 48h after last dose

Antacids/dairy within 2h of doxycycline: AVOID (chelation reduces absorption)

XI DISPENSING DECISION

Ceftriaxone 500mg IM STAT: ADMINISTER (POM) — single IM dose

Doxycycline 100mg BD x 14/7: DISPENSE (POM) — counsel food co-ingestion and sun protection

Metronidazole 400mg BD x 14/7: DISPENSE (POM) — counsel strict alcohol avoidance

Paracetamol 1g TDS PRN: DISPENSE (OTC) — safe

CLINICAL SYNTHESIS

PID with prior STI history. Triple therapy: ceftriaxone IM STAT + doxycycline + metronidazole x 14/7. Patient not pregnant — doxycycline safe. Alcohol counselled strictly (metronidazole). Partner treatment mandatory. Review 72h for clinical response.

GUIDELINES NEML 2020 | FMOH STG 6th edition (Gynaecology) | CDC STI Treatment Guidelines 2021 | WHO STI Management Guidelines 2021

CASE STUDY

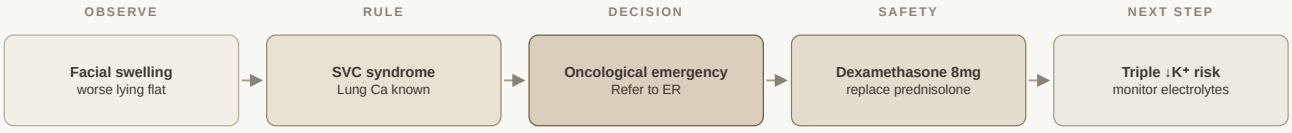
PT020

72-year-old male

REFER SAFE TO DISPENSE

with critical steroid switch and monitoring

DECISION TRAIL



I PRESENTATION

> *Progressive facial and neck swelling | hoarse voice | worsening breathlessness | inability to lie flat x 1 week; headache when bending forward*

BP 152/92 mmHg · HR 96 bpm · RR 24 brpm · Temp 37.2C · SpO2 91% · Wt 69 kg

II PATIENT CONTEXT

COMORBIDITIES

- COPD (GOLD III)
- Hypertension
- Lung adenocarcinoma (diagnosed 3 months ago — on palliative dexamethasone)
- Heart failure (EF 40% — compensated)

CURRENT MEDS

- Prednisolone 10mg OD (being replaced by dexamethasone)
- Salbutamol MDI 100mcg 2 puffs PRN
- Beclomethasone MDI 200mcg 2 puffs BD
- Ipratropium MDI 20mcg 2 puffs QDS
- Amlodipine 5mg OD
- Furosemide 40mg OD
- Spironolactone 25mg OD

ALLERGIES

No known allergies

III TARGETED HISTORY

Is the face swelling worse when lying flat or bending forward?

→ *Yes — much worse; I have to sleep sitting up*

Any arm swelling (right side)?

→ *Yes — right arm seems larger*

Any vision changes?

→ No

Currently on steroids?

→ *Yes — prednisolone; doctor recently added dexamethasone*

IV CLARIFYING QUESTION

> *Have you noticed that your facial swelling and headache are worse when you bend forward or lie flat — and do you have swelling of one arm that is larger than the other?*

V DIFFERENTIAL DIAGNOSIS

#1 Superior Vena Cava (SVC) Syndrome secondary to lung adenocarcinoma — 85%

ICD-10 · J98.0

Facial + arm swelling worse on lying flat + hoarse voice (recurrent laryngeal nerve compression) + inability to lie flat + known lung cancer; classic SVC obstruction presentation — oncological emergency

#2 Pleural effusion / worsening COPD causing positional breathlessness — 10%

ICD-10 · J90

COPD + heart failure context; however unilateral arm swelling and facial plethora pattern strongly favour SVC over simple effusion

#3 Cor pulmonale decompensation from COPD — 5%

ICD-10 · I27.2

COPD + GOLD III + heart failure; however facial plethora + arm asymmetry argues against simple decompensation

VI CLINICAL REASONING

DANGER SIGN CONFIRMED — CONCLUDE_AND_REFER: Superior Vena Cava Syndrome is an oncological emergency. Facial plethora + unilateral right arm swelling + hoarse voice (recurrent laryngeal nerve compression) + positional headache worse on bending + inability to lie flat in a patient with known lung cancer = SVC syndrome until proven otherwise. The pharmacy cannot manage this. Dexamethasone 8mg BD should be given (reduces peritumoral oedema) but ONLY in place of current prednisolone — do NOT combine. Immediate CT chest with contrast and oncology/radiation oncology referral are required. Radiotherapy is the primary treatment.

VII PHARMACOTHERAPY

Dexamethasone 8mg

BD (morning and early afternoon — NOT at night to reduce insomnia) · Oral · POM · REPLACES prednisolone — do NOT combine; reduces peritumoral oedema compressing SVC; switch from prednisolone 10mg OD → dexamethasone 8mg BD (steroid dose equivalence: prednisolone 10mg ≈ dexamethasone 1.5mg — dexamethasone 8mg BD is a HIGH therapeutic dose for SVC oedema) · Guideline: SIGN 137 Lung Cancer / NICE NG122 / FMOH STG Oncology

STOP RX REQUIRED **Prednisolone 10mg OD — IMMEDIATELY**

Do NOT combine with dexamethasone (additive corticosteroid toxicity: hyperglycaemia · immunosuppression · adrenal suppression · hypokalaemia compounded)

CONTINUE

Furosemide 40mg OD

Oral · POM · Reduces SVC-driven oedema fluid load; continue at current dose; monitor electrolytes (furosemide + dexamethasone = significant hypokalaemia risk) · Guideline: NEML 2020 §3.1

CONTINUE

Salbutamol MDI 100mcg PRN + Beclomethasone MDI 200mcg BD + Ipratropium MDI 20mcg QDS

Oral (inhaled) · POM · Continue COPD regimen unchanged — bronchodilators essential for GOLD III COPD

VIII SUPPORTIVE MEASURES

SUPPLEMENTS & WELLNESS

— Elevate head of bed to 45 degrees (reduces venous congestion); avoid tight clothing around neck and chest; encourage sitting position rather than lying flat

NON-PHARMACOLOGICAL

— Immediate hospital admission with oncology/radiation oncology referral; oxygen supplementation to maintain SpO2 >94% (currently 91%); resuscitation equipment on standby

IX REFERRAL & FOLLOW-UP

REFERRAL CRITERIA

— IMMEDIATE referral to tertiary oncology centre: radiation oncology consultation (external beam radiotherapy or stenting) is the definitive treatment for SVC syndrome; CT chest with contrast to confirm SVC obstruction; urgent oncology team alert

FOLLOW-UP PLAN

— CT chest with contrast (URGENT — same day); electrolyte panel (sodium

— potassium

— creatinine — risk of hypokalaemia from dexamethasone + furosemide); blood glucose (corticosteroid-induced hyperglycaemia); INR if any anticoagulation considered

X INTERACTION SCREEN

GROUP A — NEW × NEW

Dexamethasone x Furosemide: CLINICALLY SIGNIFICANT — additive hypokalaemia; dexamethasone causes renal potassium wasting; furosemide is potassium-depleting diuretic; combined effect requires potassium monitoring every 48h and consider potassium supplementation if K+ <3.5 mmol/L · severity: HIGH

Dexamethasone x Salbutamol: MODERATE — both cause hypokalaemia (salbutamol beta-2 agonist drives K+ into cells; dexamethasone increases renal K+ loss); additive hypokalaemia risk especially with furosemide also present — monitor K+ · severity: MODERATE

Dexamethasone x Amlodipine: dexamethasone sodium retention effect reduces amlodipine antihypertensive efficacy; BP may rise during high-dose dexamethasone — monitor and adjust amlodipine if SBP consistently >160 · severity: MODERATE

GROUP B — NEW × EXISTING

Dexamethasone x Prednisolone: DO NOT COMBINE — ABSOLUTE — dual corticosteroid therapy doubles HPA axis suppression

Cushing syndrome risk

severe hyperglycaemia

immunosuppression

Prednisolone is STOPPED; dexamethasone is the replacement · severity: HIGH — STOP ORDER

Dexamethasone x Spironolactone: dexamethasone sodium-retaining effect partially counteracts spironolactone aldosterone blockade — potassium management becomes complex; monitor K+ carefully · severity: MODERATE

Furosemide x Spironolactone: INTENDED combination (loop + potassium-sparing diuretic) — beneficial K+ balance strategy; do NOT stop spironolactone while adding dexamethasone · BENEFICIAL COMBINATION

GROUP C — RESIDUAL / DELAYED

None from prior consultations flagged

DRUG-DISEASE FLAGS

COPD + Dexamethasone: high-dose corticosteroids worsen COPD-associated infection risk (increased immunosuppression) — monitor for pneumonia and PCP

SVC syndrome + Furosemide: furosemide helps reduce venous oedema fluid load but does NOT treat the obstruction — mechanical/radiotherapy treatment required

Heart failure + Dexamethasone: sodium and fluid retention from dexamethasone may worsen heart failure — monitor weight daily and adjust furosemide

Lung cancer + Hyperglycaemia: dexamethasone-induced steroid hyperglycaemia is common — blood glucose monitoring required (consider metformin or insulin if BG >12 mmol/L)

CONTRAINDICATIONS

Prednisolone: STOP — CONTRAINDICATED concurrently with dexamethasone (dual steroid toxicity)

NSAIDs: CONTRAINDICATED in heart failure (sodium retention worsens oedema) and COPD (bronchospasm risk)

High-dose corticosteroids without PPI cover: add omeprazole 20mg OD for GI protection (stress ulcer risk with high-dose dexamethasone)

XI DISPENSING DECISION

Dexamethasone 8mg BD: DISPENSE (POM) — morning and early afternoon dosing; counsel on hyperglycaemia

Prednisolone: STOP — do NOT dispense further

Furosemide 40mg OD: CONTINUE (POM) — monitor electrolytes

Salbutamol + Beclomethasone + Ipratropium MDIs: CONTINUE (POM)

Amlodipine 5mg OD: CONTINUE with BP monitoring

Spironolactone 25mg OD: CONTINUE — K+ protection during dexamethasone + furosemide

CLINICAL SYNTHESIS

SVC syndrome — oncological emergency. CONCLUDE_AND_REFER. Dexamethasone 8mg BD replaces prednisolone immediately. Triple hypokalaemia risk (dexamethasone + furosemide + salbutamol) — electrolyte monitoring every 48h. Spironolactone continues for K+ protection. Immediate tertiary oncology referral for radiotherapy or stenting.

GUIDELINES SIGN 137 Lung Cancer Guidelines | NICE NG122 Lung Cancer | FMOH STG 6th edition (Oncology) | Oncology Emergency Management Protocols