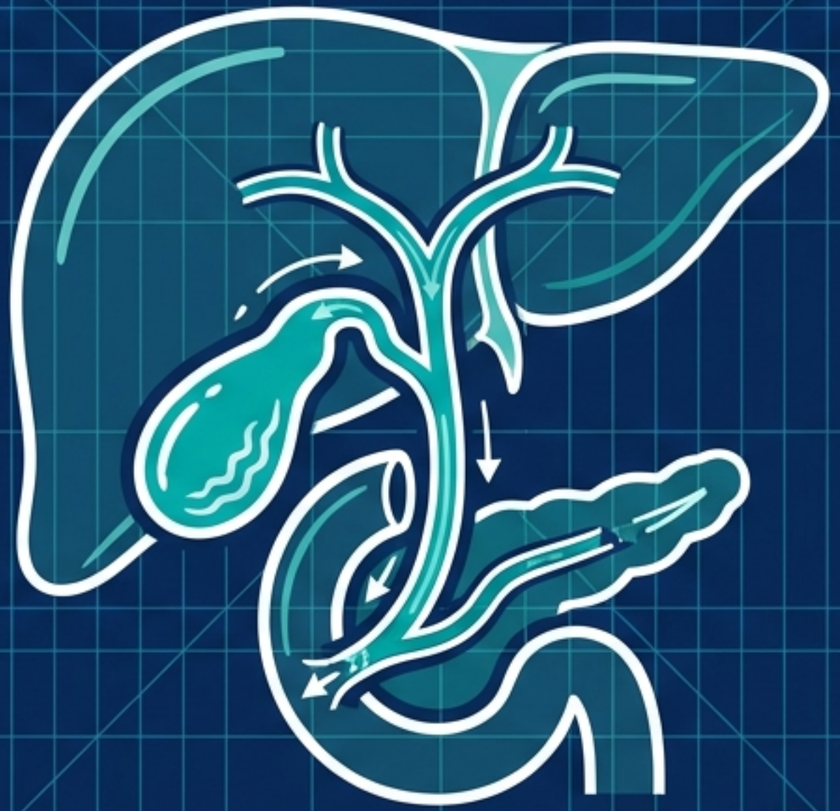
The Clinical Blueprint: Gallbladder Disease

A high-yield clinical pathway for the diagnosis, workup, and management of biliary colic and cholecystitis.



Optimized for rapid clinical reference | Based on Australian Medical Guidelines

Gallstone disease drives over 60,000 surgical admissions annually

10–15%

of Australian adults are affected by gallstone disease

The Risk Multipliers

Female Sex:
F:M ratio 2–3:1
(driven by oestrogen/ progesterone effects)

Age > 60:
>20% prevalence
(cumulative cholesterol saturation)

Metabolic: Obesity (BMI >30) up to 20-30% prevalence; Diabetes (1.5-2x risk)

Rapid Weight Loss:
Up to 25% prevalence within 3-6 months post-bariatric surgery

First Nations Disparity

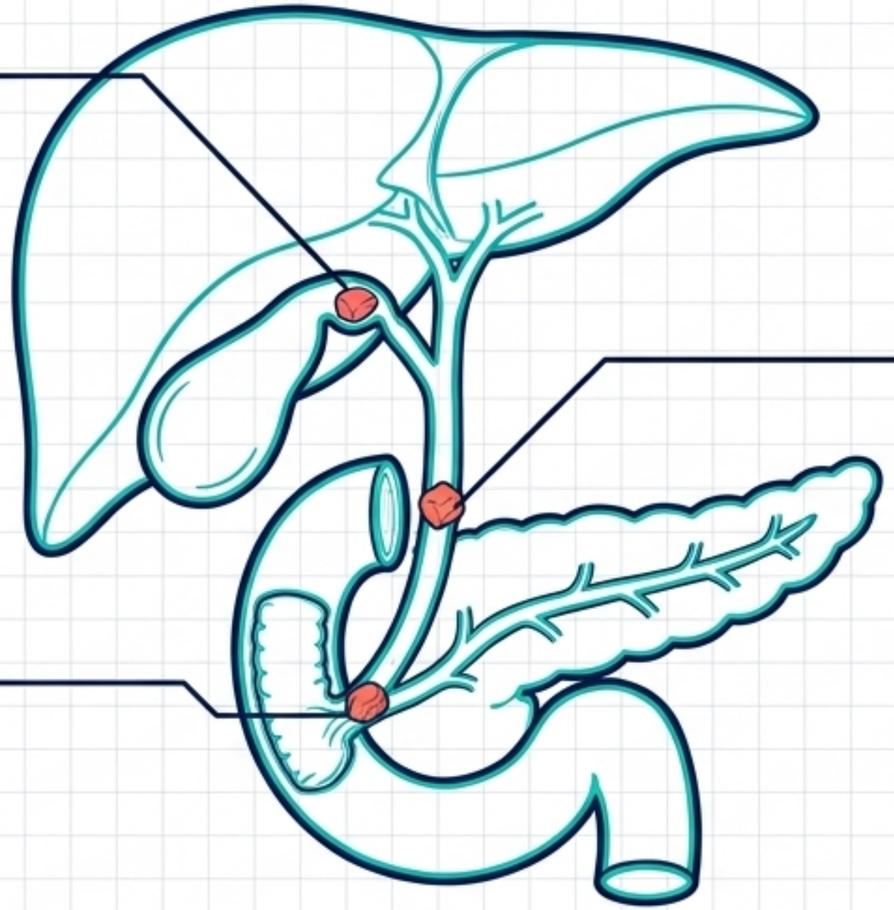
Aboriginal and Torres Strait Islander Australians experience disease rates 2–5x higher than the non-Indigenous population, with significantly earlier onset and a disproportionate risk of gallbladder cancer.

The clinical manifestation depends entirely on the anatomical point of obstruction.

Biliary Colic / Cholecystitis

Transient obstruction causes distension and steady pain (Colic).

Persistent obstruction (>4-6h) leads to wall ischaemia, **inflammation**, and bacterial infection (**Cholecystitis**).



Choledocholithiasis / Cholangitis

Mechanical obstruction leads to obstructive jaundice.

Ascending bacterial infection transforms this into **life-threatening Cholangitis**.

Gallstone Pancreatitis

Obstruction at the ampulla triggers pancreatic duct hypertension and **severe acute pancreatitis**.

Note: Stone composition is primarily cholesterol (80-85%), with pigment stones (15-20%) linked to haemolysis or biliary infection.

Biliary colic is steady, intense, and transiently triggered by gallbladder contraction.

Patient Profile Card

	**Character:** Sudden-onset, steady (not colicky) intense visceral pain. Patient is restless.
	**Location/Radiation:** RUQ or epigastrium. Classic radiation to right shoulder tip (phrenic nerve) or interscapular region (T7-T10 dermatomes).
	**Timing:** Begins 30-60 minutes post-fatty meal or nocturnally due to fasting stasis.
	**Duration:** 30 minutes to 4-6 hours. Resolves spontaneously as the stone disimpacts.

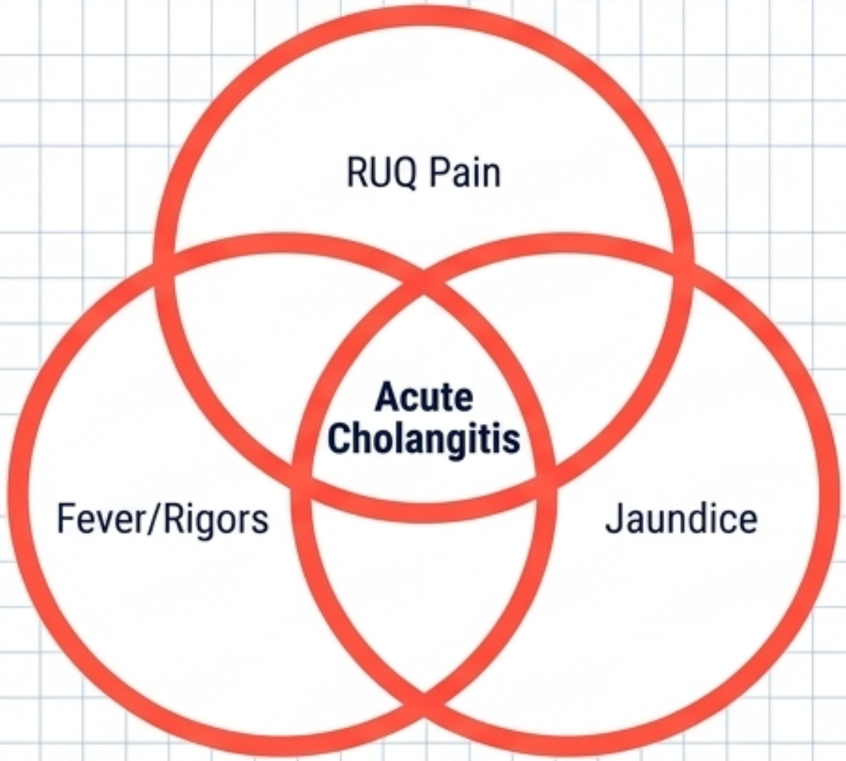
The Baseline (Between Attacks): Between attacks, the patient is entirely well. Examination is normal. No RUQ tenderness, no Murphy's sign, no fever, no jaundice.

Master Diagnostic Matrix: Differentiating simple colic from complicated pathology.

	Biliary Colic	Acute Cholecystitis	Choledocholithiasis	Acute Cholangitis	Gallstone Pancreatitis
Pain	<6 hours	**Persistent >6 hours**	Variable	Present	**Severe, radiating to back**
Fever	Absent	**Present (≥37.8°C)**	Absent	**High / Rigors**	Variable
LFTs	Normal	Normal or mild elevation (30-50%)	**Obstructive** (↑↑ALP, ↑↑GGT, ↑Bilirubin)	**Obstructive** (↑↑ALP, ↑↑GGT, ↑↑Bilirubin)	**↑ALT >150 IU/L**
Lipase	Normal	Normal	Normal	Normal	**Markedly Elevated (>3x ULN)**
WCC/CRP	Normal	**Elevated**	Normal	**Markedly Elevated**	**Elevated**

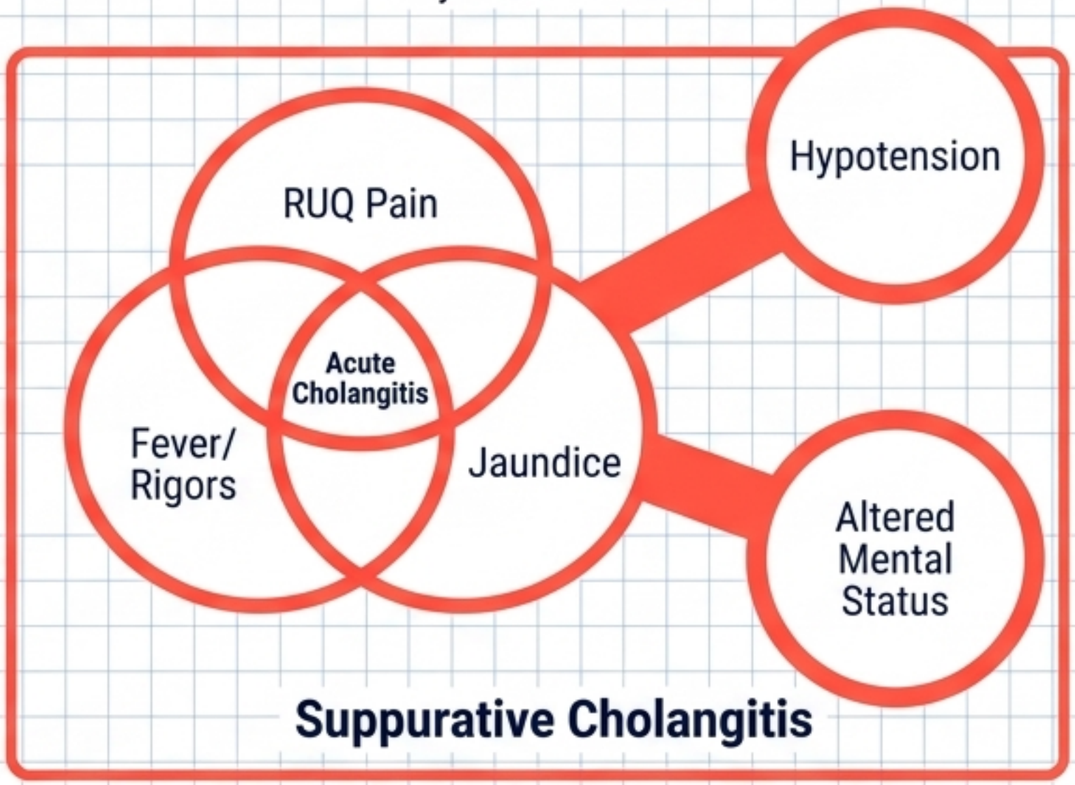
Recognizing the transition from localized inflammation to systemic sepsis.

Charcot's Triad



Note: Sensitivity is approximately 50–70% for acute cholangitis.

Reynold's Pentad



Note: Indicates suppurative (ascending) cholangitis. This is a life-threatening emergency carrying 20-30% mortality without intervention.

ACTION: Patients exhibiting these features mandate urgent emergency admission, double blood cultures, broad-spectrum IV antibiotics, and urgent ERCP for biliary decompression.

The initial workup confirms stones, assesses complications, and rules out mimics.

Transabdominal RUQ Ultrasound

First-Line Essential

- **Target:** >95% sensitivity for gallstones >2mm.
- **Key Lookouts:** Stone size, gallbladder wall thickness (>3mm suggests cholecystitis), pericholecystic fluid, and CBD diameter (normal ≤6mm).

Liver Function Tests

Essential

- **Target:** Identifies choledocholithiasis.
- **Key Lookouts:** Normal in colic. Raised ALP/GGT/Bilirubin indicates obstruction. Markedly elevated ALT (>5x ULN) suggests biliary cause or pancreatitis.

Serum Lipase

Essential

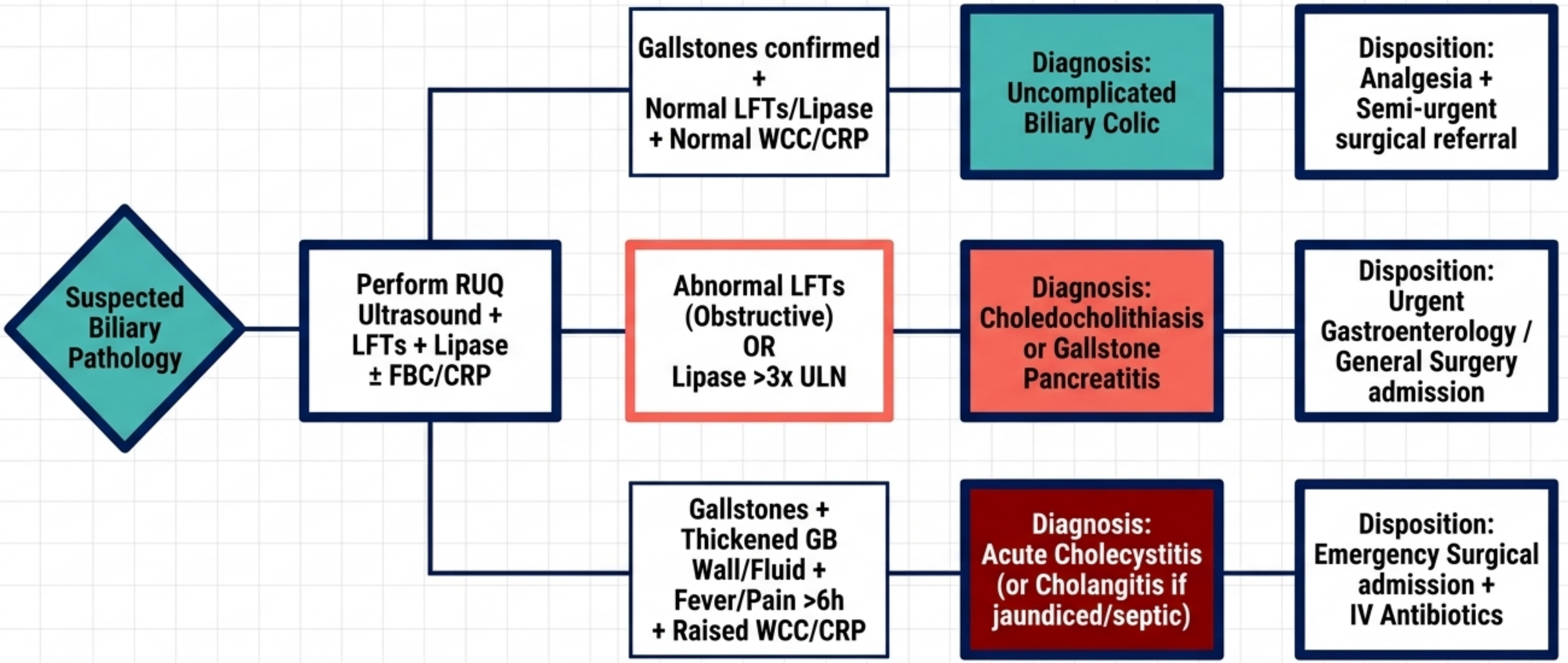
- **Target:** Rules out gallstone pancreatitis.
- **Key Lookouts:** >3x upper limit of normal is diagnostic. Preferred over amylase due to higher sensitivity/ specificity and longer window of elevation (8-14 days).

FBC & CRP

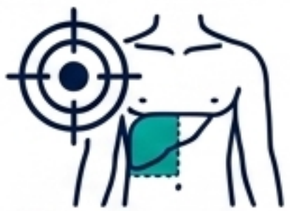
Available/Supportive

- **Target:** Quantifies systemic inflammation.
- **Key Lookouts:** Leukocytosis (>11 × 10^9/L) and elevated CRP support cholecystitis or cholangitis.

Diagnostic Algorithm: From suspicion to specialist referral.



Tokyo Guidelines (TG18): Validated diagnostic criteria for acute cholecystitis



Item A: Local Signs of Inflammation

Murphy's sign, RUQ mass, pain, or tenderness.

+

Item B: Systemic Signs of Inflammation

Fever (>37.8°C), elevated CRP (>3 mg/dL), or elevated WCC (>11 × 10^9/L).

+

Item C: Imaging Findings

Wall thickening, pericholecystic fluid, distension, or sonographic Murphy's sign.

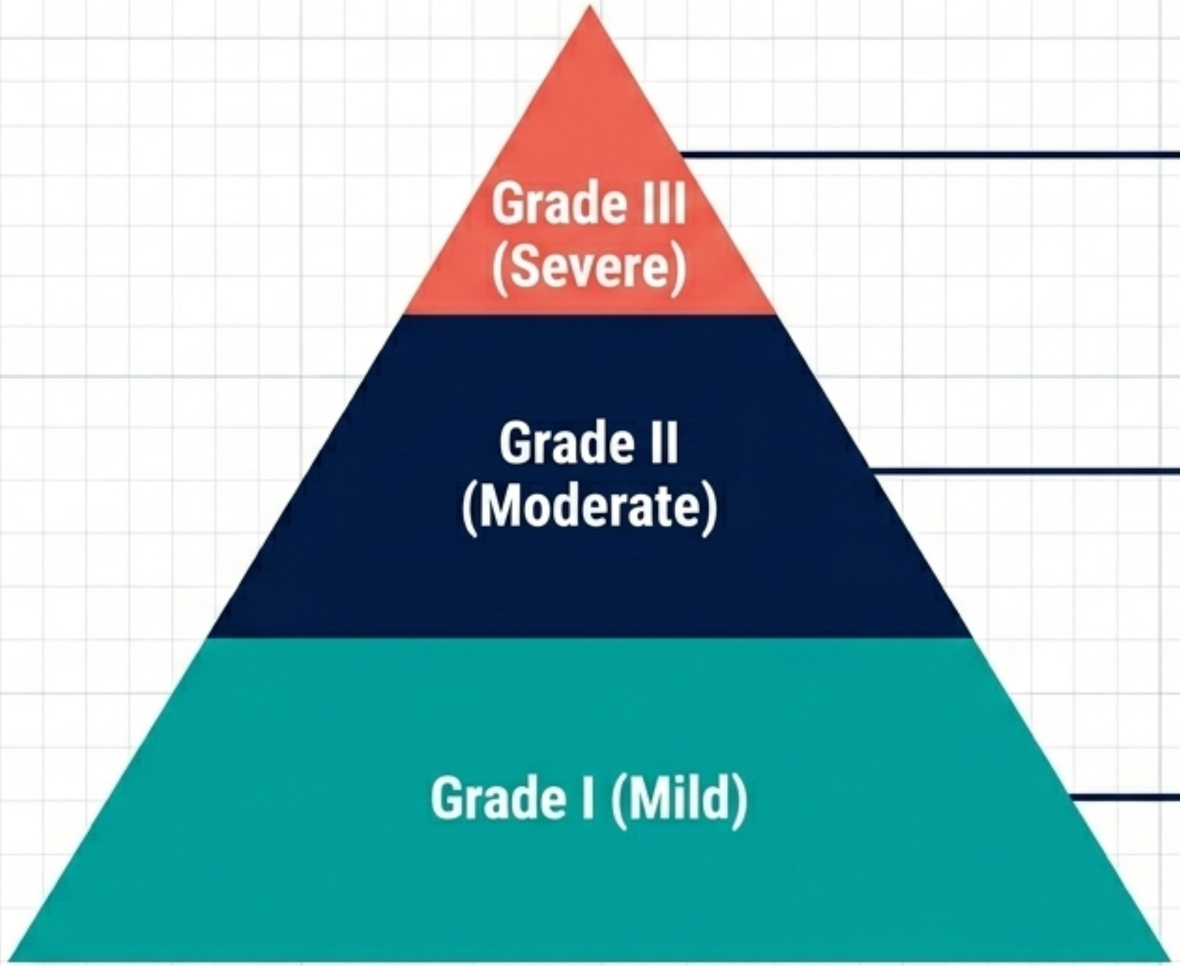
=

The Output Keys:

Suspected Diagnosis:
One item in A
+ One item in B.

Definite Diagnosis:
One item in A
+ One item in B
+ Item C.

TG18 Severity Grading: Stratifying acute cholecystitis for clinical disposition.



Criteria: Uncomplicated. No organ dysfunction, no severe local inflammation, suitable for early lap choly.

Clinical Setting: General Surgical Ward.

Criteria: Complicated but localized. WCC >18, palpable mass, symptom duration >72h, or marked local inflammation (gangrenous, abscess, biliary peritonitis).

Clinical Setting: General Surgical Ward ± HDU.

Criteria: Organ Dysfunction. Hypotension (vasopressors), altered consciousness, PaO_2/FiO_2 <300, oliguria/creatinine >2.0, PT-INR >1.5, or platelets <100.

Clinical Setting: ICU Admission ➡ Urgent percutaneous cholecystostomy or cholecystectomy.

Specialist Investigations: Resolving diagnostic uncertainty and managing complications.

Step 1: MRCP (Magnetic Resonance Cholangiopancreatography)

- **When to use:** Obstructive LFTs or dilated CBD >6mm on ultrasound without visible stones.
- **Details:** Non-invasive, 85-95% sensitivity for CBD stones.

Step 2: ERCP (Endoscopic Retrograde Cholangiopancreatography)

- **When to use:** Therapeutic intervention for confirmed CBD stones. Allows sphincterotomy/extraction.
- ⚠ **Warning:** Not diagnostic alone due to 3-10% complication rate.

Step 3: CT Abdomen (IV Contrast)

- **When to use:** Suspected complications (perforation, abscess, gallstone ileus, pancreatic necrosis).
- ⚠ **Warning:** Poor sensitivity for uncomplicated radiolucent cholesterol stones.

Step 4: HIDA Scan (Cholescintigraphy)

- **When to use:** Suspected acalculous cholecystitis or biliary dyskinesia (GB ejection fraction <35%) when ultrasound is normal.

Acute Symptom Management: Suppressing gallbladder spasm and pain.

Ibuprofen (First-Line Analgesic)

Dose: 400–600 mg PO TDS–QDS.

Clinical Rationale: NSAIDs are superior to opioids for biliary pain as they reduce gallbladder spasm via prostaglandin inhibition.

⚠ Avoid if eGFR <30.

Paracetamol (Adjunct)

Dose: 1 g PO QDS (max 4 g/day).

Clinical Rationale: Synergistic with NSAIDs. Safe in pregnancy.

⚠ Max 2g/day in severe hepatic impairment.

Oxycodone (Second-Line)

Dose: 5–10 mg PO PRN Q4–6H.

Clinical Rationale: Reserve for severe colic refractory to NSAIDs. Short-term use only.

⚠ Reduce dose if eGFR 10-50.

Ondansetron (Antiemetic)

Dose: 4–8 mg PO/IV Q8H PRN.

Clinical Rationale: First-line antiemetic, no renal adjustment required.

Empirical Antimicrobial Regimens: Targeting enteric Gram-negatives and anaerobes

Acute Cholecystitis / Cholangitis Confirmed

Mild Acute Cholecystitis (Community-Acquired, Grade I)

First-Line IV: Ceftriaxone 1–2g IV OD + Metronidazole 500mg IV TDS.

Oral Step-Down: Amoxicillin-clavulanate 875/125mg PO BD (total duration 5-7 days).

Severe Cholecystitis (Grade II/III) or Cholangitis

Broad-Spectrum IV: Piperacillin-tazobactam 4.5g IV TDS-QDS (5-14 days).

Note: Adjust for renal function. Cholangitis requires ERCP decompression within 24-48h.

Penicillin Allergy Alert

⚠ **Non-anaphylaxis:** Ciprofloxacin 400mg IV BD + Metronidazole 500mg IV TDS.

⚠ **Anaphylaxis:** Consult ID; consider Meropenem or Aztreonam + Metronidazole.

Definitive Surgical Management: Timing is dictated by acute inflammation.

Elective Cholecystectomy

Indication: **Biliary Colic** (even after a single confirmed episode).

Timing: **4-8 weeks** post-referral.

Wait-and-watch is only for asymptomatic incidental stones.

Early Cholecystectomy

Indication: **Acute Cholecystitis** (TG18 Grade I and selected Grade II).

Timing: Within **72 hours** of symptom onset (same admission).
Reduces total hospital stay, costs, and complications compared to delayed surgery.

Percutaneous Cholecystostomy

Indication: **Severe Acute Cholecystitis** (TG18 Grade III) or patient unfit for surgery.

Timing: **Immediate temporizing measure**.

Image-guided drainage under local anaesthesia, with interval cholecystectomy considered 6-8 weeks later.

Pharmacological Alternative: Ursodeoxycholic Acid (UDCA) is not first-line, but used for prophylaxis during rapid weight loss or for highly symptomatic patients unfit for surgery with non-calcified stones <10mm.

Postoperative Monitoring and the risk of Post-Cholecystectomy Syndrome.

Day-surgery or overnight stay. Monitor for pain, nausea, early complications (bile leak 0.2-1%).

GP review. Assess wound healing and dietary tolerance. No requirement for long-term fat restriction.

Repeat LFTs to ensure normalization if preoperatively deranged (rules out retained CBD stones).

Post-Cholecystectomy Syndrome (10-40% of patients)

Bile Salt Diarrhoea	Persistent Biliary Pain
Continuous bile flow into duodenum (5-10% prevalence). Managed with Cholestyramine 4g PO OD-BD before meals.	Investigate for retained CBD stones, sphincter of Oddi dysfunction, or functional GI disorders via MRCP or EUS.

First Nations Health: Gallbladder disease presents earlier, more frequently, and with higher severity.

Extreme Prevalence

Gallstone disease affects Aboriginal and Torres Strait Islander Australians at rates 2–5x higher than the non-Indigenous population. It is a leading cause of hospitalisation, often presenting in the 20s and 30s.

Genetic Predisposition

A missense variant in the ABCB4 gene (p.C456Y) is prevalent, predisposing patients to low-phospholipid-associated cholelithiasis (LPAC syndrome) causing early-onset, recurrent disease.

The Cancer Threat

Gallbladder cancer incidence is 3–5x higher. Late diagnosis combined with limited access to specialist HPB surgery drives poorer outcomes.

Adapting the pathway: A framework for equitable First Nations biliary care.

Barriers	Clinical Actions
Geographic Remoteness	**Proactive Surgery & Telehealth:** Do not manage expectantly. Refer symptomatic patients early (Category 2) for elective surgery to prevent emergency evacuations. Utilize telehealth (MBS 99-113) for pre-op assessment.
Cultural Safety & Distrust	**Empowered Consent:** Ensure gender-concordant care where requested. Respect kinship obligations in decision-making. Coordinate with local ACCHOs and use Aboriginal Liaison Officers.
Health Literacy & Language	**Interpreters & Plain Language:** English may be a second language. Mandate use of Aboriginal Interpreter Services for all surgical consent and discharge planning.
Delayed Presentation	**Cancer Vigilance:** Maintain high suspicion for complications. Fast-track HPB referral for stones >3cm, polyps, or porcelain gallbladder due to outsized cancer risk.

Modifying the therapeutic arsenal for special populations

Pregnancy

- **Risk:** 5-12% prevalence (oestrogen + hypomotility).
- **Imaging:** RUQ US first-line. Avoid CT. MRI without gadolinium if needed.
- **Management:** Paracetamol safe. **Avoid NSAIDs** (ductus arteriosus risk). Lap choly safely performed in 2nd trimester if refractory.

Paediatrics

- **Risk:** Rising via **obesity**, but maintain suspicion for haemolytic disorders (**sickle cell, spherocytosis**).
- **Diagnosis:** Murphy's sign unreliable. Presentation is often **vague nausea/poor feeding**.
- **Management:** Tertiary paediatric surgical referral. UDCA not routinely recommended.

Elderly (≥65)

- **Risk:** >20% prevalence. Frequent atypical presentations (absent fever/Murphy's sign, **delayed gangrene**).
- **Management:** **High risk for open conversion**. **Percutaneous cholecystostomy** is a highly valuable temporizing alternative for high-risk surgical candidates.

Pathway adjustments for physiological impairment and altered immunity.

Renal Impairment (CKD)

- **Presentation:** Blunted inflammatory response (lower fever/WCC). High pigment stone risk in dialysis.
- **Adjustment:** Avoid NSAIDs if eGFR <30. Reduce Pip-Tazobactam dosing. Ceftriaxone requires no adjustment.

Hepatic Impairment (Cirrhosis)

- **Presentation:** High pigment stone risk (30-50%). High perioperative morbidity.
- **Adjustment:** Stratify by Child-Pugh. A/B: Lap choly generally safe. C: Conservative or cholecystostomy preferred. Max paracetamol 2g/day.

Immunocompromised (HIV, Transplant, ICU)

- **Presentation:** High risk of Acalculous Cholecystitis (5-10% of acute cases) and opportunistic infections (CMV, Cryptosporidium). Blunted systemic signs.
- **Adjustment:** HIDA scan is diagnostic gold standard for acalculous disease. Percutaneous cholecystostomy frequently preferred due to patient acuity.

Surgical Referral Pathways: Triage and disposition logistics.

Green Tier: Semi-Urgent (Category 2, ≤90 days)

- **Conditions:** Confirmed Biliary Colic, Polyps >10mm, Porcelain Gallbladder, Stones >3cm
- **Destination:** General Surgeon (Public Outpatients or Private)

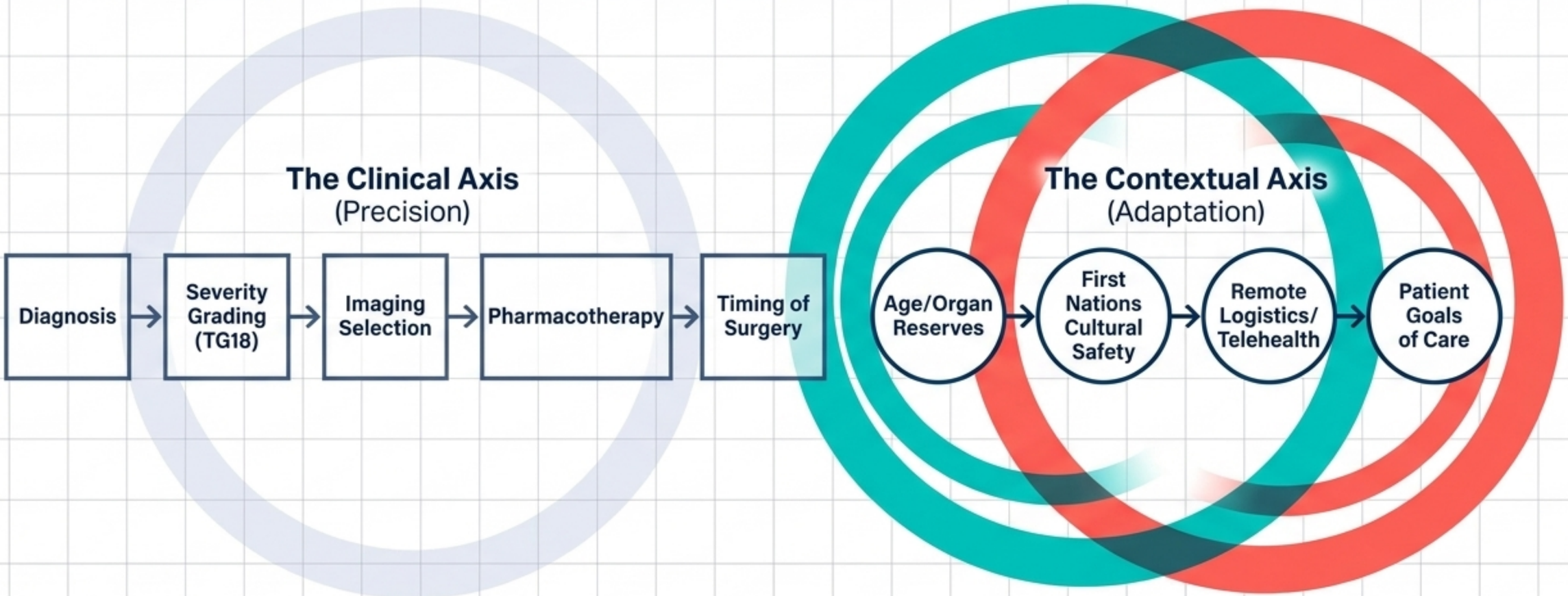
Orange Tier: Urgent (<14 days)

- **Conditions:** Suspected Gallbladder Cancer (refer immediately to specialized HPB surgical oncologist).
- **Choledocholithiasis without sepsis** (refer to Gastroenterologist for ERCP).

Red Tier: Emergency (Immediate Admission)

- **Conditions: Acute Cholecystitis** (ED → Acute Surgical Unit for <72h surgery).
  Acute Cholangitis (ED → ICU/Endoscopy for ERCP within 24-48h).
  Gallstone Pancreatitis (ED → Med/Surg Unit).

Synthesis: The Holistic Biliary Care Model



Mastery of gallbladder disease requires more than algorithmic precision. It demands the real-time adaptation of strict surgical guidelines to fit the physiological limits, geographical realities, and cultural contexts of the individual patient. A perfect clinical diagnosis fails without an equitable and accessible disposition.