Acute Pancreatitis in the Hospital Setting

Acute pancreatitis is a common and potentially life-threatening condition in hospitalized patients, often triggered by gallstones or alcohol use. Early recognition and management are critical to prevent complications and improve outcomes. This pamphlet provides students with a guide to diagnose, evaluate, and manage acute pancreatitis in the hospital setting, with clinical scenarios to apply the knowledge.

Clinical Presentation

Definition:

- **Acute pancreatitis:** Acute inflammation of the pancreas, often due to autodigestion by pancreatic enzymes (e.g., trypsin), leading to local and systemic complications.

Symptoms:

- **General:** Epigastric pain (constant, severe, radiating to the back), nausea, vomiting, anorexia, fever (if infection or systemic inflammation).
- **Severe Cases:** Dyspnea (pleural effusion, ARDS), altered mental status (hypoperfusion, organ failure), jaundice (biliary obstruction).

Vital Signs/Exams:

- **Mild Acute Pancreatitis:**
  - **BP/HR:** Normal or mild tachycardia (HR 90-110 bpm).
  - **Exam:** Epigastric tenderness, guarding, hypoactive bowel sounds (ileus).
- **Severe Acute Pancreatitis:**
  - **BP:** Hypotension (SBP <90 mmHg, hypovolemia, or SIRS).
  - **HR:** Tachycardia (HR >120 bpm, SIRS, pain).
  - **RR:** Tachypnea (ARDS, pleural effusion), hypoxia (SpO2 <90%).
  - **Exam:** Severe epigastric tenderness, rebound (peritonitis), Cullen's sign (periumbilical bruising), Grey Turner's sign (flank bruising), both rare.

Associated Conditions:

- Gallstones (40-50%), alcohol use (30-40%), hypertriglyceridemia, ERCP, trauma, medications (e.g., azathioprine), infections (e.g., mumps, coxsackievirus), autoimmune pancreatitis, pancreatic cancer.

Causes and Differential Diagnosis

Causes of Acute Pancreatitis (I GET SMASHED Mnemonic):

- **Idiopathic:** 10-20% of cases, often after ruling out other causes.
- **Gallstones:** Most common (40-50%), often small stones causing obstruction at the ampulla of Vater.
- **Ethanol (Alcohol):** Chronic heavy use (30-40%), typically >4-5 drinks/day for years.
- **Trauma:** Blunt abdominal trauma, post-surgical (e.g., pancreatic surgery).
- **Steroids:** Drug-induced (e.g., corticosteroids).
- **Mumps (and other infections):** Viral (coxsackievirus, CMV), parasitic (Ascaris).
- **Autoimmune:** Type 1 (IgG4-related), associated with other autoimmune diseases.
- **Scorpion Sting:** Rare, specific to Tityus trinitatis venom (Trinidad).
- **Hypertriglyceridemia:** TG >1000 mg/dL, often in diabetes or familial dyslipidemia.
- **ERCP:** Post-ERCP pancreatitis (3-5% risk), due to ductal trauma.
- **Drugs:** Azathioprine, thiazides, sulfonamides, valproic acid.

Differential Diagnosis:

- **Perforated Peptic Ulcer:** Epigastric pain, free air on X-ray, peritonitis (rebound tenderness).
- **Acute Cholecystitis:** RUQ pain, Murphy's sign, ultrasound (gallbladder wall thickening).
- **Bowel Obstruction:** Nausea, vomiting, distension, air-fluid levels on X-ray.
- **Mesenteric Ischemia:** Severe pain out of proportion to exam, lactic acidosis, CT angiography (occlusion).
- **Myocardial Infarction:** Epigastric pain in atypical cases (elderly), EKG changes, troponin elevation.

Causes and Clinical Features Table

Cause	Clinical Features	Associated Risk Factors	Key Diagnostic Clues
Gallstones	Epigastric pain, jaundice	Female, obesity, age >40	Ultrasound: gallstones, dilated CBD.
Alcohol	Epigastric pain, nausea, vomiting	Chronic alcohol use (>4 drinks/day)	Lipase >3x ULN, history of alcohol use.
Hypertriglyceridemia	Epigastric pain, lipemia retinalis	TG >1000 mg/dL, diabetes	TG level, milky serum appearance.
Post-ERCP	Epigastric pain, fever post-procedure	Recent ERCP, ductal trauma	Elevated lipase, recent procedure.

Diagnosis and Labs

Diagnostic Criteria (Requires 2 of 3):

- Abdominal pain consistent with pancreatitis (epigastric, radiating to back).
- Serum lipase or amylase >3x upper limit of normal (ULN).
- **Imaging findings (e.g., CT:** pancreatic edema, necrosis).

Labs:

- **Lipase/Amylase:**
  - **Lipase:** >3x ULN (more specific, remains elevated 7-14 days).
  - **Amylase:** >3x ULN (less specific, may be elevated in salivary gland disease, bowel obstruction).
- **CBC:**
  - Leukocytosis (SIRS, infection), leukopenia (severe sepsis).
  - **Hematocrit:** >44% (hemoconcentration, poor prognosis), anemia (GI bleed, hemolysis).
- **CMP:**
  - **Glucose:** Hyperglycemia (stress response, diabetes), hypoglycemia (severe disease).
  - **Calcium:** Hypocalcemia (saponification, poor prognosis), hypercalcemia (etiology).
  - **LFTs:** Elevated bilirubin, ALT/AST (gallstone pancreatitis).
  - **Creatinine:** Elevated Cr (AKI, hypovolemia, poor prognosis).
- **Inflammatory Markers:**
  - **CRP:** >150 mg/L at 48h (predicts severity, necrosis).
- **Procalcitonin:** Elevated in infected necrosis, sepsis.
- **Triglycerides:** >1000 mg/dL (etiology if gallstones/alcohol ruled out).
- **Lactate:** >2 mmol/L (hypoperfusion, SIRS, poor prognosis).
- **Blood Cultures:** If fever, suspected infection (e.g., infected necrosis, cholangitis).

Imaging:

- **Abdominal CT: Gold standard:** Pancreatic edema, peripancreatic fluid, necrosis (non- enhancing areas), complications (pseudocyst, abscess).
  - **Timing:** 48-72h after onset (early CT may underestimate necrosis).
- **Abdominal Ultrasound:**
  - **First-line for gallstone pancreatitis:** Gallstones, dilated common bile duct (CBD), sludge. Limited for pancreatic visualization (bowel gas interference).
- **MRCP:** If suspected CBD obstruction (e.g., persistent jaundice, dilated CBD on US).

- **Chest X-ray:** Pleural effusion, ARDS (bilateral infiltrates), atelectasis (pain-induced shallow breathing).

Severity Scoring:

- **Ranson Criteria (At Admission):**
  - Age >55, WBC >16,000/µL, glucose >200 mg/dL, AST >250 U/L, LDH >350 U/L.
  - **At 48h:** Hct drop >10%, BUN increase >5 mg/dL, Ca <8 mg/dL, PaO2 <60 mmHg, base deficit >4 mEq/L, fluid sequestration >6 L.
  - **Score ≥3:** Severe pancreatitis, higher mortality.
- **BISAP Score (Within 24h):**
  - BUN >25 mg/dL, Impaired mental status, SIRS (≥2 criteria), Age >60, Pleural effusion.
  - **Score ≥3:** Increased risk of mortality, organ failure.
  - **APACHE II:** ICU scoring (more complex, predicts mortality).

Severity Scoring and Treatment Table

Severity	Scoring Tool	Treatment Strategy	Notes
Mild (Ranson <3)	Ranson, BISAP	NPO, IV fluids (NS 250-500 mL/h), pain control	Monitor for complications, early feeding if tolerated.
Severe (Ranson ≥3)	Ranson, BISAP, APACHE II	ICU, aggressive fluids, ERCP (gallstone)	Monitor for necrosis, organ failure.
Infected Necrosis	Procalcitonin, CT findings	Antibiotics (meropenem), drainage (IR consult)	Surgical consult, delay necrosectomy >4 weeks.
Gallstone Pancreatitis	Ultrasound, MRCP	ERCP within 24-48h, cholecystectomy	Cholecystectomy during same admission.

Treatment and Overall Management

General Principles:

- **Stabilize:** ABCs (airway, breathing, circulation), IV access, telemetry, oxygen if SpO2 <90%.
- **Supportive care:** Fluids, pain control, NPO initially, treat underlying cause.
- **Prevent complications:** Monitor for necrosis, organ failure, infection.

Initial Management:

- **Fluid Resuscitation:**
  - **Goal:** Correct hypovolemia, prevent organ failure.

    - NS or LR 250-500 mL/h IV (5-10 mL/kg/h) for first 12-24h, then titrate (target urine output >0.5 mL/kg/h).
- **Monitor:** Lactate, BUN, Hct (goal: Hct decrease 5-10% in 24h), avoid overhydration (ARDS risk).
- **Pain Control:**
    - Morphine 2-5 mg IV q4-6h PRN
    - Avoid NSAIDs (risk of GI bleeding, renal injury).
- **NPO:** Bowel rest until pain resolves, nausea subsides (typically 24-48h); early oral feeding (low-fat diet) if tolerated.

Severity-Based Management:

- Mild Acute Pancreatitis (Ranson <3, BISAP <3):
    - Supportive care (as above), early feeding within 24-48h if tolerated.
    - **Monitor:** Labs (lipase, Hct, BUN) q12-24h, imaging if no improvement.
- Severe Acute Pancreatitis (Ranson ≥3, BISAP ≥3):
    - **ICU admission:** If organ failure (respiratory, renal, cardiovascular), lactate >4 mmol/L, or SIRS.
    - **Aggressive fluids:** NS/LR 500 mL/h IV for first 12h, then titrate.
    - **Monitor:** Q4-6h labs (Cr, BUN, lactate), daily imaging (CT if worsening).

Specific Treatments:

- **Gallstone Pancreatitis:**
    - **ERCP:** Within 24-48h if cholangitis (fever, jaundice, sepsis) or persistent obstruction (elevated bilirubin, dilated CBD).
    - **Cholecystectomy:** During same admission (mild) or after resolution (severe), to prevent recurrence.
- **Hypertriglyceridemia:**
    - **Insulin drip:** 0.1-0.3 units/kg/h IV (lowers TG by activating lipoprotein lipase); if glucose <200 mg/dL, add D10W.
    - **Lipid-lowering:** Fenofibrate 145 mg PO daily (after acute phase).
- **Alcohol-Induced:**
    - **Alcohol cessation:** Social work consult, addiction medicine (e.g., naltrexone 50 mg PO daily post-discharge).
    - **Thiamine:** 100 mg IV daily x 3 days (prevent Wernicke's).

Complications and Management:

- **Pancreatic Necrosis:**
    - **Sterile:** Supportive care, delay necrosectomy >4 weeks (allows demarcation).

    - **Infected:** Meropenem 1 g IV q8h (or piperacillin-tazobactam 4.5 g IV q6h), CT-guided drainage (consult IR), surgical necrosectomy if refractory.
- **Pseudocyst (>4 weeks):**
    - **Asymptomatic:** Observe.
    - **Symptomatic (pain, obstruction):** Endoscopic drainage (cystogastrostomy), surgical if fails.
- **ARDS:** Low tidal volume ventilation (6 mL/kg), PEEP, prone positioning.
- **AKI:** Fluids, monitor Cr, dialysis if severe (e.g., Cr >3 mg/dL, anuria).
- **Sepsis:** Blood cultures, broad-spectrum antibiotics, source control (e.g., drain abscess).

Monitoring:

- **Labs:** Q12-24h (lipase, Hct, BUN, Cr, Ca, TG if relevant).
- **Imaging:** Repeat CT if worsening (e.g., suspected necrosis, infection).
- **Vital Signs:** Q4h (fever, tachycardia, hypotension indicate SIRS/sepsis).
- **Pain/Nutrition:** Daily assessment (restart oral intake when pain-free, no nausea).

Key Pearls

- **Diagnosis:** 2 of 3 (epigastric pain, lipase >3x ULN, imaging findings).
- **Fluids:** Aggressive early resuscitation (NS/LR 250-500 mL/h), titrate to urine output >0.5 mL/kg/h.
- **Severity:** Ranson ≥3, BISAP ≥3, or organ failure = severe; ICU for severe cases.
- **Gallstone Pancreatitis:** ERCP within 24-48h if cholangitis; cholecystectomy to prevent recurrence.
- **Complications:** Necrosis (infected: antibiotics, drainage), pseudocyst (drain if symptomatic), ARDS (lung-protective ventilation).
- **Pain:** Morphine IV, avoid NSAIDs; NPO until pain resolves, then early feeding.
- **Monitor:** Labs q12-24h, imaging if worsening, vital signs q4h for SIRS/sepsis.

References

- **UpToDate:** “Acute Pancreatitis: Diagnosis and Management” (2025).
- **NEJM:** “Acute Pancreatitis: A Review” (2024).
- **Am J Gastroenterol:** “Management of Severe Acute Pancreatitis” (2023).
- **Pancreatology:** “Gallstone Pancreatitis: Diagnosis and Treatment” (2024).

Clinical Scenarios

Case 1: A 45-Year-Old Male with Abdominal Pain

- **Presentation:** A 45-year-old male with a history of gallstones presents with severe epigastric pain radiating to the back, nausea, and vomiting for 12 hours. Exam: BP 130/80 mmHg, HR 100 bpm, Temp 38°C, epigastric tenderness, hypoactive bowel sounds.
- **Labs:** Lipase 900 U/L (ULN 300), WBC 14,000/µL, Hct 40%, ALT 150 U/L, bilirubin 3 mg/dL, Cr 1.0 mg/dL.
- **Imaging:** Ultrasound shows gallstones, dilated CBD; CT shows pancreatic edema.
- **Diagnosis:** Mild Acute Pancreatitis (Gallstone-Induced) → Epigastric pain, lipase >3x ULN, gallstones on US, Ranson 1.
- **Management:** NPO, NS 250 mL/h IV for 24h (target urine output >0.5 mL/kg/h). Morphine 2 mg IV q4h PRN (pain). GI consult for ERCP (within 48h, due to dilated CBD). Plan cholecystectomy during admission. Monitor labs q12h (lipase, Hct, BUN). Start low-fat diet when pain-free (day 2). Discharge when tolerating oral intake.

Case 2: A 50-Year-Old Female with Alcohol Use

- **Presentation:** A 50-year-old female with chronic alcohol use (6 drinks/day) presents with epigastric pain, vomiting, and fever for 24 hours. Exam: BP 90/60 mmHg, HR 120 bpm, Temp 39°C, severe epigastric tenderness, rebound tenderness, Cullen's sign.
- **Labs:** Lipase 1200 U/L, WBC 18,000/µL, Hct 46%, BUN 30 mg/dL, Ca 7.5 mg/dL, lactate 3.0 mmol/L.
- **Imaging:** CT shows 40% pancreatic necrosis, peripancreatic fluid.
- **Diagnosis:** Severe Acute Pancreatitis (Alcohol-Induced) → Epigastric pain, lipase >3x ULN, necrosis on CT, Ranson 4.
- **Management:** ICU admission (hypotension, lactate 3.0). NS 500 mL/h IV for 12h, then titrate. Morphine 2 mg IV q4h PRN. NPO. Thiamine 100 mg IV daily (alcohol use). Monitor labs q6h (Cr, BUN, lactate), repeat CT in 48h (assess necrosis). If infected necrosis suspected (fever, worsening), meropenem 1 g IV q8h, CT-guided drainage. Addiction medicine consult for alcohol cessation (naltrexone post-discharge if LFTs okay).

Case 3: A 35-Year-Old Male with Hypertriglyceridemia

- **Presentation:** A 35-year-old male with uncontrolled diabetes presents with epigastric pain and nausea for 18 hours. Exam: BP 110/70 mmHg, HR 95 bpm, Temp 37.5°C, epigastric tenderness, lipemia retinalis.

- **Labs:** Lipase 1000 U/L, TG 1500 mg/dL, glucose 300 mg/dL, Hct 42%, Cr 1.2 mg/dL.
- **Imaging:** CT shows pancreatic edema, no necrosis.
- **Diagnosis:** Mild Acute Pancreatitis (Hypertriglyceridemia-Induced) → Epigastric pain, lipase >3x ULN, TG 1500 mg/dL, BISAP
- **Management:** NPO, NS 250 mL/h IV for 24h. Insulin drip 0.1 units/kg/h IV (lowers TG), add D10W if glucose <200 mg/dL. Morphine 2 mg IV q4h PRN. Monitor labs q12h (TG, glucose, lipase). Start fenofibrate 145 mg PO daily post-acute phase. Low-fat diet when pain-free (day 2). Discharge with diabetes education (endocrinology follow-up)