

Diagnostic Imaging Pathways - Pancreatitis (Acute)

Population Covered By The Guidance

This pathway provides guidance on the investigation of adult patients with suspected acute pancreatitis and its complications.

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Quick User Guide

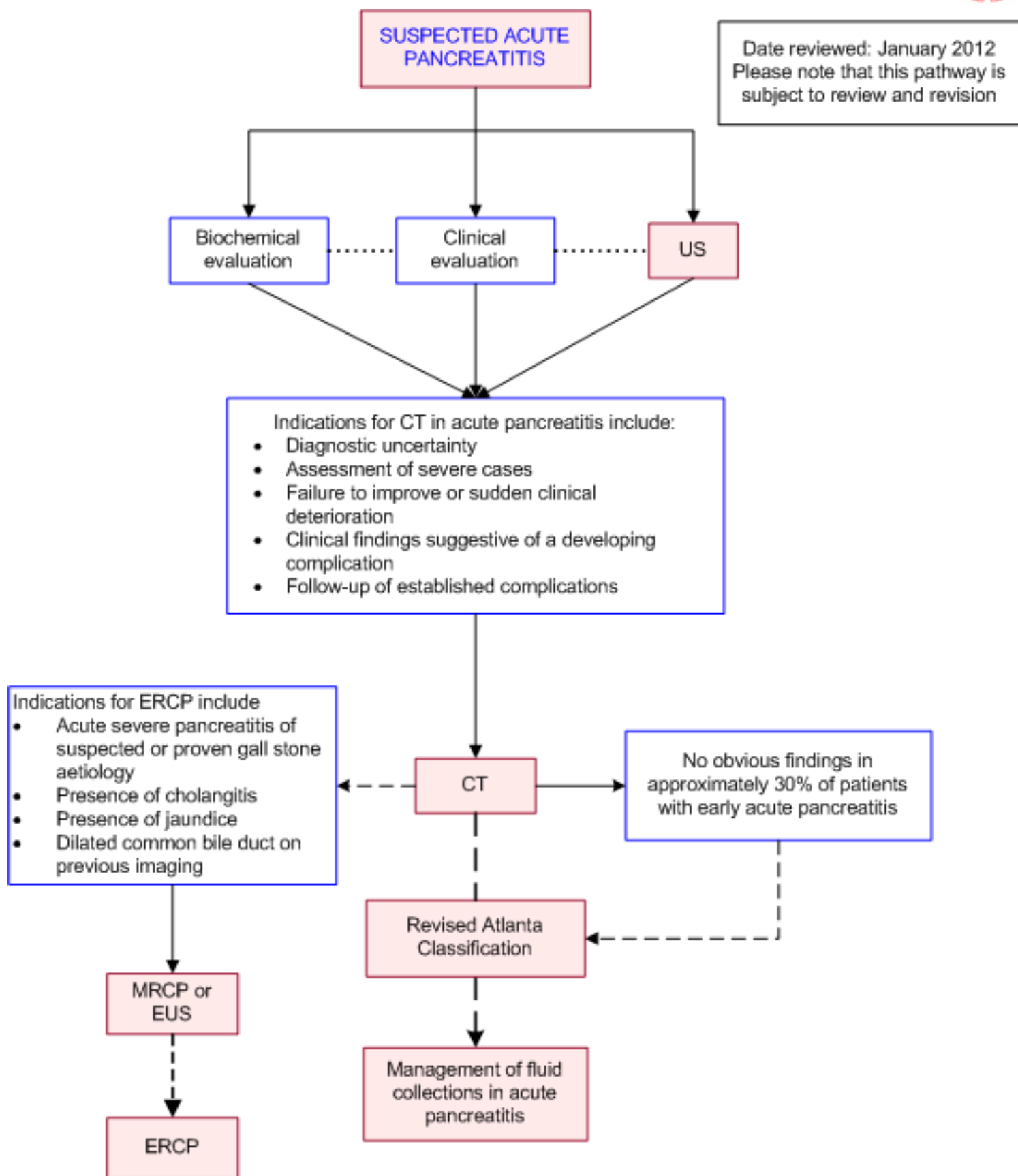
Move the mouse cursor over the **PINK** text boxes inside the flow chart to bring up a pop up box with salient points.

Clicking on the **PINK** text box will bring up the full text.

The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram



Teaching Points

Role of Imaging in acute pancreatitis



- Exclude an underlying cause (e.g. gallstones)
- Assess severity
- Detect complications
- Guide treatment of complications (e.g. fluid collection drainage)

CT SCAN - routine CT scan is not indicated. Indications include

- Where diagnosis is in doubt
- Clinically severe cases to assess degree of pancreatic necrosis
- Failure to improve or sudden deterioration
- Imaging complications of pancreatitis

US Scan

- To help determine aetiology of pancreatitis
- Assess for gallstone-induced pancreatitis
- Assess bile duct if abnormal liver function

ERCP (Endoscopic Retrograde Cholangiopancreatography) - indications include

- Severe pancreatitis of proven or suspected gallstone aetiology
- Presence of cholangitis
- Presence of jaundice

Acute Pancreatitis

- The diagnosis of pancreatitis is usually made clinically and biochemically [1](#)
- In suspected acute pancreatitis, imaging is used to [1](#)
 - Exclude an underlying cause (e.g. gallstones)
 - Assess severity
 - Detect complications
- Clinical definition of acute pancreatitis (whether or not chronic pancreatitis is present) requires at least 2 out of 3 of the following [2](#)
 - Abdominal pain strongly suggestive of acute pancreatitis
 - Serum amylase / lipase levels of ? 3 times normal level
 - Characteristic imaging findings on imaging (US / CT / MRI)

Revised Atlanta Classification

- In 2008, acute pancreatitis Classification Working group revised the 1992 Atlanta classification to clarify previous areas of confusion, improve clinical assessment & management, standardise the description of patients for reporting clinical studies and to offer a standardised means of data collection for future studies to allow objective evaluation of new therapies [2](#)
- **Summary of Revised Atlanta Classification** [17,18](#)

Morphologic Type	Associated Collections
<4 weeks	
Interstitial edematous pancreatitis	Sterile / Infected Acute Peri-pancreatic fluid collection



	(APFCs)
Necrotizing pancreatitis	Sterile / Infected Acute parenchymal necrotic collections or Sterile / Infected Acute Peri-pancreatic necrotic collection or Sterile / Infected combined pancreatic and peri-pancreatic necrotic collection (ANCs)
?4 weeks	
Interstitial edematous pancreatitis	Sterile / Infected pseudocyst
Necrotizing pancreatitis	Sterile / Infected walled-off necrosis (WON)

- Clinical severity and organ failure is calculated using scoring systems like Marshall system, SOFA, APACHE-II or Ranson scoring systems [19,20,21,22](#)

Computed Tomography (CT)

- Contrast enhanced CT (CE-CT) is the imaging modality of choice for evaluating pancreas and the surrounding tissues [3,7](#) and is often the first radiological investigation for suspected acute pancreatitis in many institutions
- Routine CT is not indicated in mild acute pancreatitis unless there are clinical or other signs of deterioration [1,7,8,9](#), and there is no advantage of performing early imaging to predict the clinical severity of acute pancreatitis more than a clinical evaluation [9](#)
- 14-28% of CT scans are normal in mild pancreatitis [7,8](#)
- Ideal time for CE-CT is 48 hours after onset of symptoms for better accuracy in detecting pancreatic necrosis but in practice, patients with undiagnosed abdominal pain CE-CT is often performed on admission or the diagnosis of AP would have been made on CE-CT
- Indications for CT scan include [1,3,8](#)
 - Diagnostic uncertainty
 - Assessment of severity and to detect complications
 - Failure to improve on treatment (>48 hrs)
 - Clinical findings suggesting a developing complication (e.g. fever, pain, hypotension, decreasing haematocrit)
 - Sudden deterioration in clinical status following an initial response to medical treatment
 - Follow-up and monitoring of established complications
 - Guidance of interventional procedures such as percutaneous fine needle aspiration and/or catheter drainage of fluid collections
- Combination of pre and post-contrast enhancement appearances permits the assessment of the degree of pancreatic necrosis and surrounding peri-pancreatic and intra-abdominal fluid collections. The severity of disease as demonstrated on CT (CT severity index) correlates with the risk of morbidity and mortality [10](#)
- Disadvantages - exposure to ionising radiation with repeat scanning

Endoscopic Retrograde Cholangiopancreatography (ERCP)

- Mainly used to locate and remove gallstones in the common bile duct among patients with severe pancreatitis attributable to gallstones [1](#)
- Other indications for ERCP in the setting of acute pancreatitis include [1](#)
 - Presence of ascending cholangitis
 - Presence of jaundice
 - Dilated common bile duct on previous imaging
- Urgent ERCP and sphincterotomy is indicated in patients with severe gallstone pancreatitis who fail to respond to treatment within 48 hours [14,15](#)
- Similarly patients with gallstone acute pancreatitis who develop ascending cholangitis stand to benefit from early ERCP and endoscopic sphincterotomy [16](#)

Fluid Collections In Acute Pancreatitis

- The RAC classifies fluid collections in acute pancreatitis based on both the morphologic classification they are associated with and the disease timeframe
- Collections can be sterile or infected at any time and can occur in all the collection types
- Fluid collections associated with IEP in the first 4 weeks of onset are called acute peri-pancreatic fluid collections (APFC). If these collections progress / persist for 4 weeks or more, they are termed pancreatic pseudocysts. Pseudocysts occur in 10-20 % of patients as a complication of acute pancreatitis [17](#)
- Fluid collections associated with necrotizing pancreatitis are called acute necrotic collections (ANC) if occurring within 4 weeks and walled-off necrosis (WON) after 4 weeks. ANCs can be further divided based on the morphological classification of the pancreatitis they are associated with. Parenchymal collections occurring within the first 4 weeks should also be classified as necrotic collections [17](#)
- The question of intervention (usually percutaneous aspiration/drainage) for relatively symptomatic pseudocysts/fluid collections is a balance between on the one hand, the risks of introducing infection into a sterile collection and draining an "immature" cyst and on the other hand, the complications of a large untreated, unresolved fluid collection
- Fluid collections in acute pancreatitis can be categorised into the following (general guidelines only)
 1. Acute peri-pancreatic fluid collections (APFCs)
 - Infection is extremely rare
 - Majority get reabsorbed with no complications
 - Fine needle aspiration (FNA) is only indicated if strong suspicion of infection. Otherwise no active invasive treatment is necessary
 2. Pancreatic pseudocysts [23](#)
 - A pancreatic pseudocyst consists of enzyme-rich fluid surrounded by a wall of granulation or fibrous tissue
 - May be localised to the pancreas or located remotely. Communication with the pancreatic ductal system is present in up to 80% of cases
 - Spontaneous regression occurs in 30-50% of cases and most pseudocysts less than 4cm in diameter resolve within 6 weeks
 - Infection can be noted by the presence of gas locules within pseudocyst. If no gas is visible on CE-CT, FNA can be done to rule out infection but risk of introducing infection by performing FNA should be taken into consideration
 - Drainage is indicated for pseudocysts larger than 5cm, that are growing, symptomatic or infected

3. Necrotic collections (ANCs and WONs)

- FNA is useful to distinguish between infected and sterile necrosis, with a sensitivity of 88-96% and specificity of 90-96% [24,25](#)
 - Indications for FNA include: failure to improve within 48-72 hours of commencing medical therapy, persistent symptoms for more than 7 days with greater than 30% necrosis or clinical suspicion of sepsis with less than 30% necrosis
 - Sterile ANCs may be drained based on patient's clinical condition. Percutaneous drainage is preferable though surgery and endoscopic procedures may be done rarely
 - Infected ANCs are drained with percutaneous drainage but surgery / endoscopic procedure may be needed later if recurs / inadequate
 - Sterile WON are drained based on clinical circumstances and percutaneous drainage is preferred but surgical drainage / endoscopic drainage may be needed for a cure
 - Infected WON are drained with percutaneous drainage as an interim with surgery to follow
- Indications for aspiration/drainage include [26,27,28,29](#)

1. Diagnosis of possible infection/abscess. If aspiration confirms infection, possible therapeutic options are dependent on the morphology of the collection and the clinical status of the patient. They include
 - Percutaneous catheter drainage either as a definitive procedure or as a "holding" measure pending surgery
 - Surgical drainage/debridement as a first-line treatment
 - Endoscopic drainage via the stomach or duodenum
2. Continuing symptoms considered due to the mass effect of the fluid collection
3. Cyst enlarging on serial follow-up imaging. In this situation ERCP may be useful. If communication between the pancreatic duct and the fluid collection is demonstrated, the need for prolonged drainage is likely and surgery may be a better option
4. Some authorities suggest size alone as a criterion for drainage (usually around 5 cm)

Ultrasound

- Recommended to help determine the aetiology in all patients with suspected acute pancreatitis [1,2,3](#)
- Primarily used to assess the biliary tree for gallstones, duct dilatation/obstruction and to exclude other pathology [1,2,3](#)
- Helps distinguish fluid collections from solid inflammatory masses
- Useful for follow-up of pancreatic fluid collections if seen well on initial ultrasound [4](#)
- Limitations
 - Visualisation of the pancreas is usually sub-optimal due to overlying bowel gas from a coexistent ileus [5,6](#)
 - Detection of intra-parenchymal and retroperitoneal fluid collections correlates poorly with pancreatic necrosis [3](#)
 - Often underestimates the presence, extent and complexity of fluid collections

Magnetic Resonance Cholangiopancreatography (MRCP) and Endoscopic

Ultrasonography (EUS)

- In many centres MRCP and EUS are performed following CT scanning if gall stone pancreatitis is being suspected prior to patients undergoing invasive ERCP if needed
- MRCP is reported to have a high negative predictive value of 100% for CBD stones [11,12](#)
- MRCP is non-invasive and has no ionising radiation risk compared to CT. It is reported to have a sensitivity of around 62% and specificity of around 98% for CBD stones [12](#)
- EUS is an invasive imaging method but is reported to have a higher diagnostic yield (51% vs 20%) compared to MRCP in a prospective study looking for causes of idiopathic pancreatitis following traditional cross-sectional imaging [11](#)
- Some studies report higher diagnostic yield for EUS and MRCP compared to ERCP in idiopathic pancreatitis [13](#)

Endoscopic Ultrasonography (EUS)

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- Some studies report higher diagnostic yield for EUS and MRCP compared to ERCP in idiopathic pancreatitis [13](#)

References

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. [Download the document](#)

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