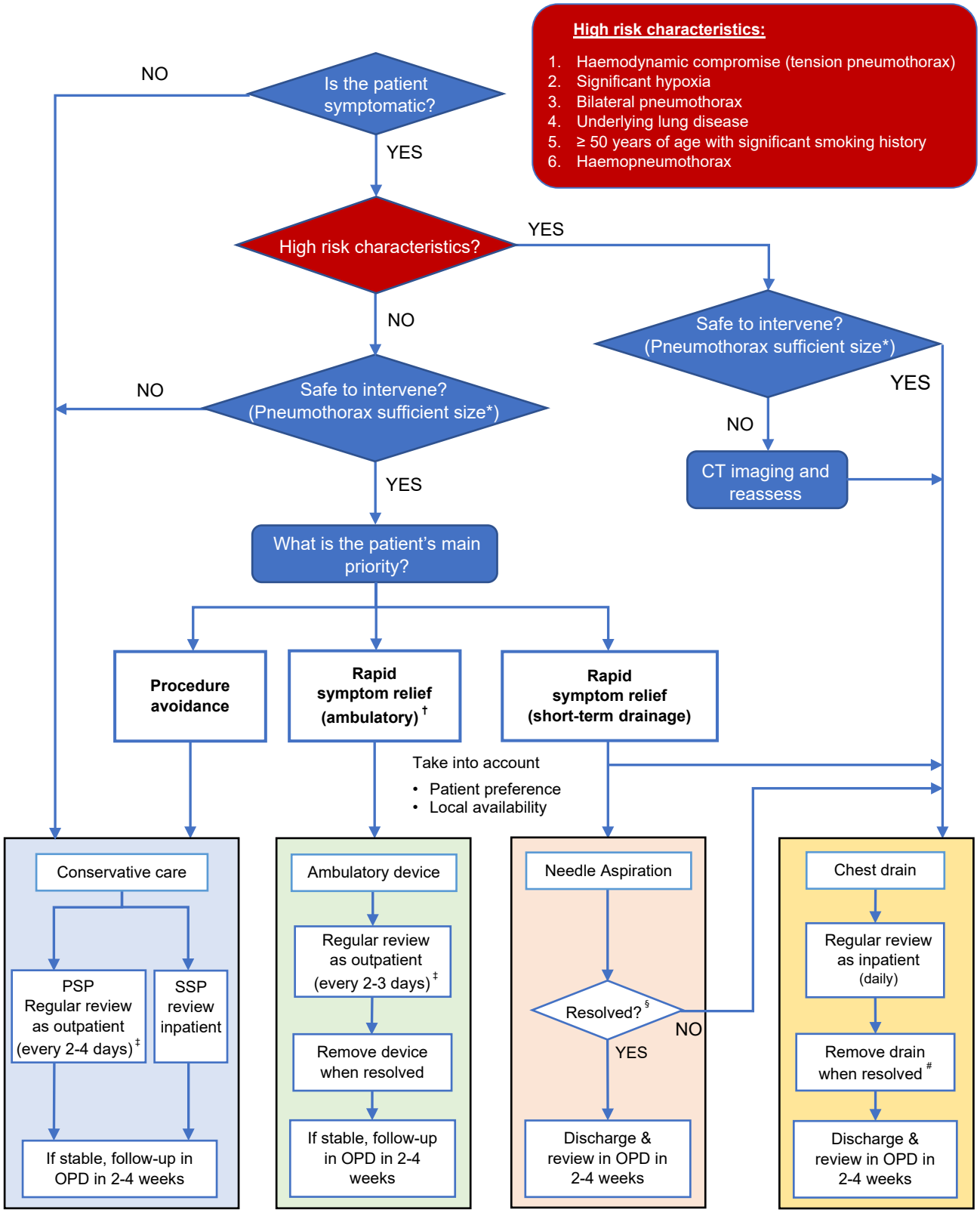
Appendix 1 – Clinical pathways/decision trees

Pneumothorax Pathway



* Pneumothorax of sufficient size to intervene depends on clinical context but, in general, usually ≥ 2cm laterally or apically on CXR, or any size on CT scan which can be safely accessed with radiological support.

† If ambulatory pathway available locally.

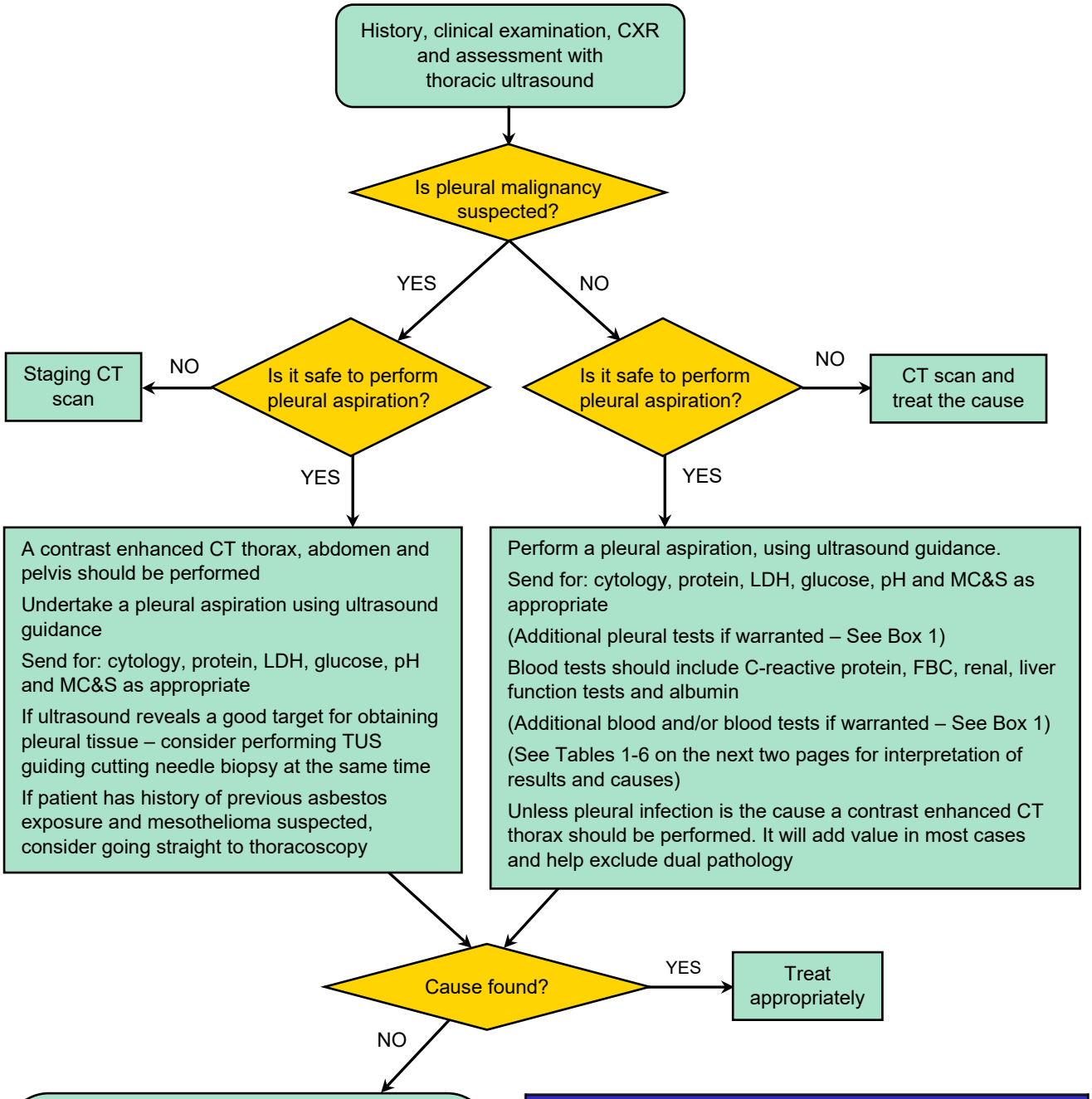
‡ At review, if enlarging pneumothorax or symptoms consider chest drain insertion and admission.

§ Success: improvement in symptoms and sustained improvement on CXR.

Talc pleurodesis can be considered on the first episode of pneumothorax in high risk patients in whom repeat pneumothorax would be hazardous (eg, severe COPD).

CXR, chest X-ray; COPD, chronic obstructive pulmonary disease; OPD, outpatient department; PSP, primary spontaneous pneumothorax; SSP, secondary spontaneous pneumothorax.

Unilateral pleural effusion diagnostic pathway



Box 1: Additional pleural fluid tests and blood tests

SUSPECTED DISEASE	TESTS
Chylothorax	- pf cholesterol and triglyceride
Haemothorax	- pf haematocrit
Empyema	- pf centrifuge
Rheumatoid disease	- pf glucose and pH
Pancreatitis	- serum lipase
Cardiac failure	- serum NT-ProBNP
Lymphoma	- pf lymphocyte subsets
Autoimmune disease	- serum autoimmune screen
IgG4 disease	- pleural biopsy and serum IgG4
Amyloid	- Congo red staining

CXR, chest X-ray; FBC, full blood count; LDH, lactate dehydrogenase; NT-proBNP, N-terminal prohormone brain natriuretic peptide; PE, pulmonary embolism; TB, tuberculosis; TUS, thoracic ultrasound.

Unilateral pleural effusion diagnostic pathway – Tables 1-3

Table 1

Light's criteria
Pleural fluid is an exudate if one or more of the following criteria are met: • Pleural fluid protein divided by serum protein is >0.5 • Pleural fluid lactate dehydrogenase (LDH) divided by serum LDH is >0.6 • Pleural fluid LDH >2/3 the upper limits of laboratory normal value for serum LDH

Table 2

Transudates	Exudates
Common	**Common**
• Congestive cardiac failure	• Malignancy
• Liver cirrhosis	• Pleural infection
• Hypoalbuminaemia	• Pulmonary embolism
• Nephrotic syndrome	• Autoimmune pleuritis
Less common	**Less common**
• Nephrotic syndrome	• Drugs
• Mitral stenosis	• Lymphatic disorders
• Peritoneal dialysis	• Meigs syndrome
• Chronic hypothyroidism	• Post-coronary artery bypass graft
• Constrictive pericarditis	• Benign asbestos related pleural effusion

Table 3

Causes of lymphocytic pleural effusion
Malignancy
Tuberculosis
Lymphoma
Congestive cardiac failure
Post-coronary bypass graft
Rheumatoid arthritis
Chylothorax
Yellow nail syndrome

Unilateral pleural effusion diagnostic pathway – Tables 4-6

Table 4

Causes of bilateral pleural effusions
Congestive cardiac failure
Hypoalbuminaemia
Renal failure
Liver failure
SLE and other autoimmune diseases
Widespread malignancy including abdominal/pelvic malignancy
Bilateral pulmonary embolus

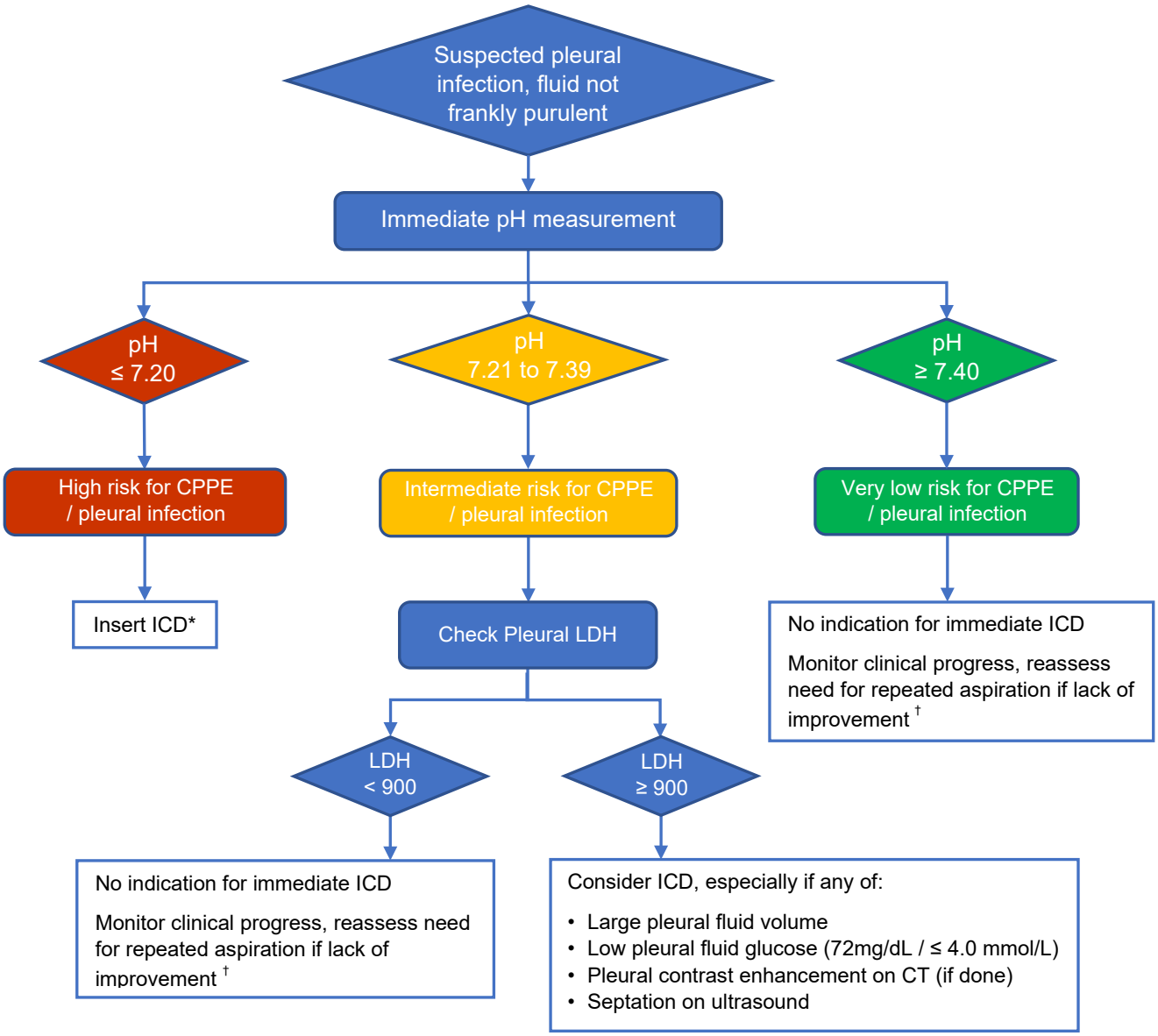
Table 5

Pleural fluid lipid values in chylothorax and pseudochylothorax	
Chylothorax:	
• Triglycerides	– high >1.24 mmol/L (110 mg/dL)
• Cholesterol	– low
• Cholesterol crystals	– absent
• Chylomicrons	– usually present
Pseudochylothorax:	
• Triglycerides	– low
• Cholesterol	– high >5.18 mmol/L (200 mg/dL)
• Cholesterol crystals	– often present
• Chylomicrons	– absent

Table 6

Causes of chylothorax and pseudochylothorax	
Chylothorax:	
• Trauma:	thoracic surgery (especially if involving posterior mediastinum, eg, oesophagectomy), thoracic injuries
• Neoplasm:	lymphoma or metastatic carcinoma
• Miscellaneous:	disorders of lymphatics (including lymphangioleiomyomatosis), tuberculosis, cirrhosis, obstruction of the central veins, chyloascites
• Idiopathic (about 10%)	
Pseudochylothorax:	
• Tuberculosis	
• Rheumatoid arthritis	

Suspected pleural infection, non-purulent fluid – initial decision tree

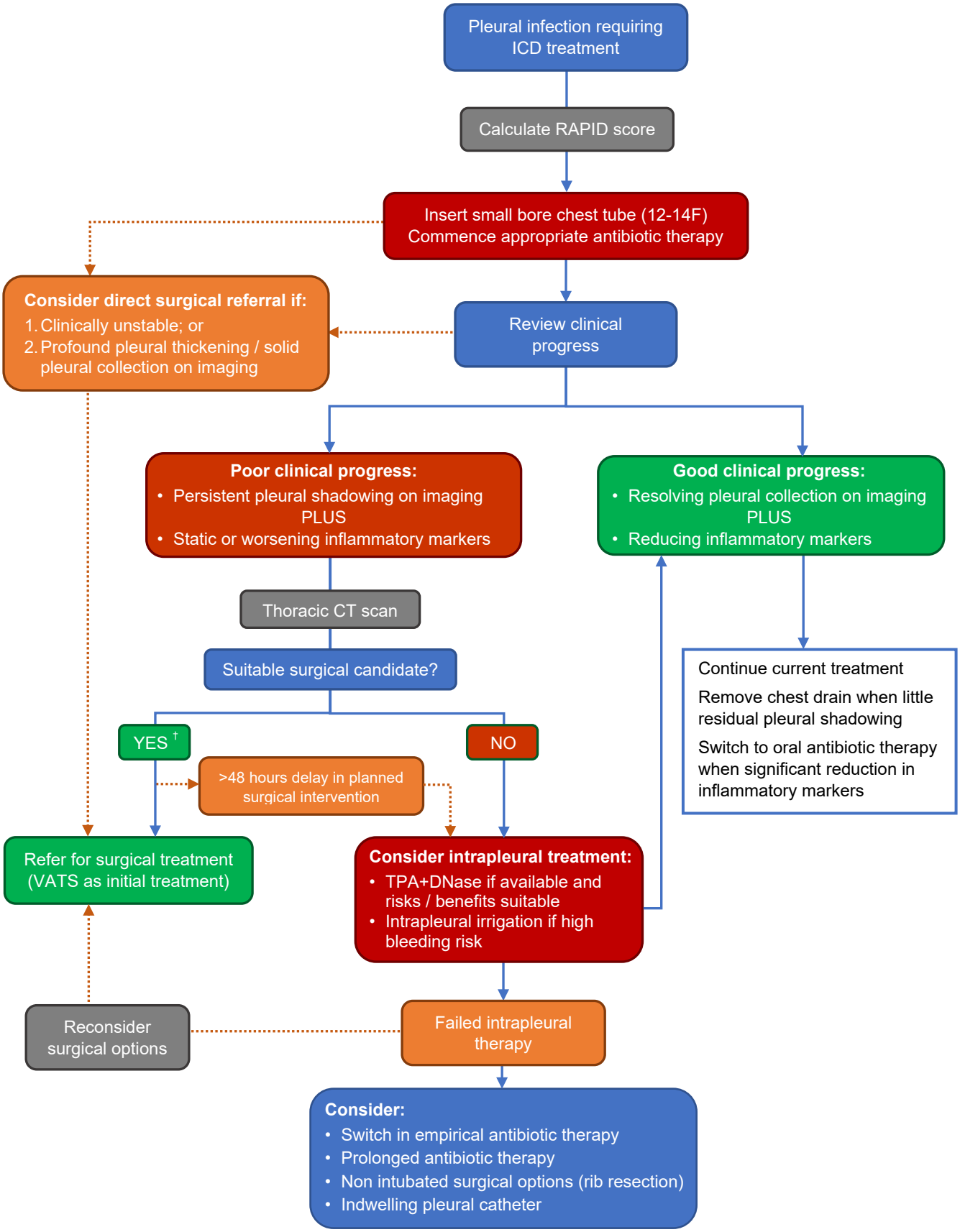


* Assuming ultrasound demonstrates safe volume of accessible pleural fluid.
† As evidenced by ongoing temperature, persisting elevation of inflammatory markers. Those with septations and pleural pH >7.4 should also be considered for drainage.

Initial pH	Level of risk for CPPE / pleural infection	Initial action regarding drainage
≤ 7.2	High risk	Insert ICD, assuming ultrasound demonstrates safe volume of accessible pleural fluid
> 7.2 to < 7.4	Intermediate risk	Check LDH and review other parameters which may support CPPE / pleural infection. Consider ICD insertion if LDH > 900, especially if any of the following: • Large pleural fluid volume • Low pleural fluid glucose (72 mg/dL / ≤ 4.0 mmol/L) • Pleural contrast enhancement on CT • Septation on ultrasound
≥ 7.4	Very low risk	No indication for immediate ICD

CPPE, complex parapneumonic effusion; LDH, lactate dehydrogenase; ICD, intercostal drain.

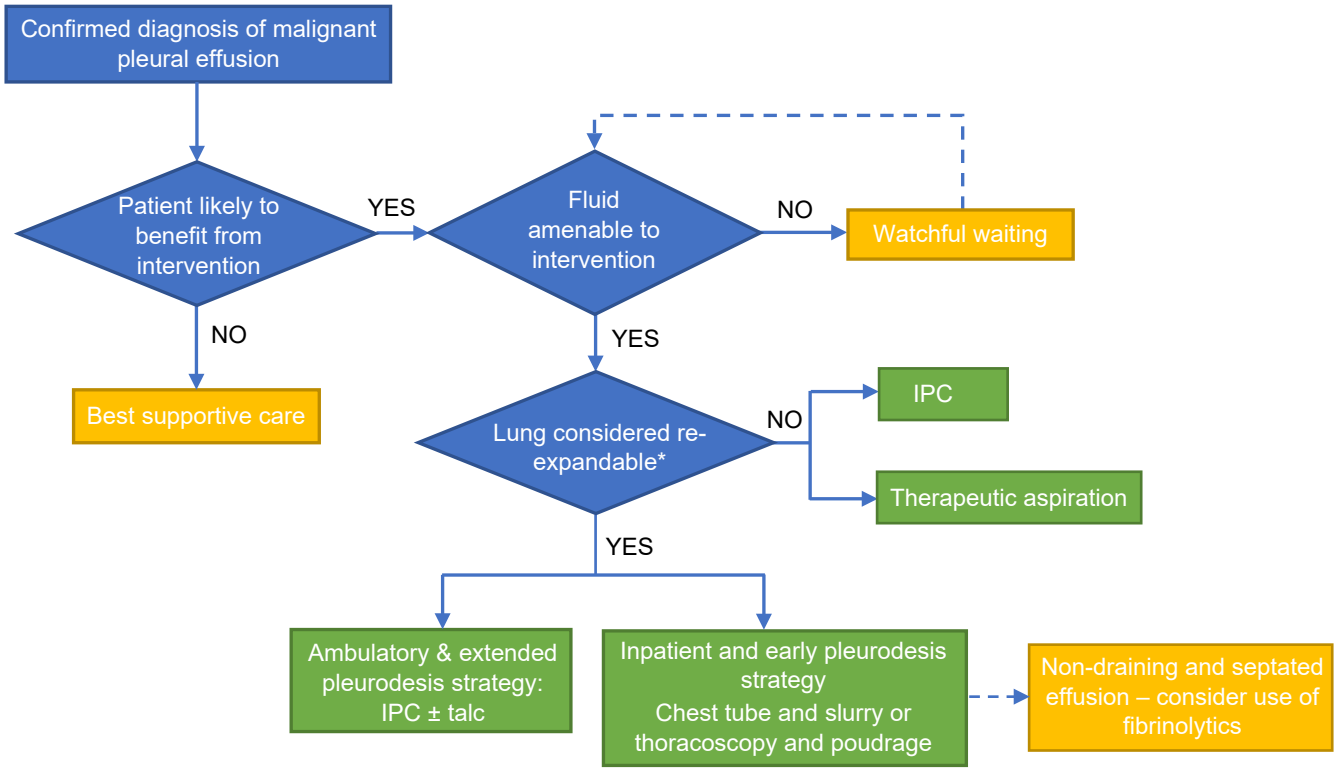
Pleural infection treatment pathway



* Antibiotic therapy should be based on likely organisms initially and adapted according to positive culture results, with consideration of anaerobic cover throughout.
† Intrapleural treatment may be considered prior to surgical treatment in liaison with surgical expertise.

ICD, intercostal drain; TPA, tissue plasminogen activator; VATS, video-assisted thoracoscopy surgery.

Malignant pleural effusion pathway



* Review of imaging, possible trial of benefit of aspiration before final decision.

IPC, indwelling pleural catheter.