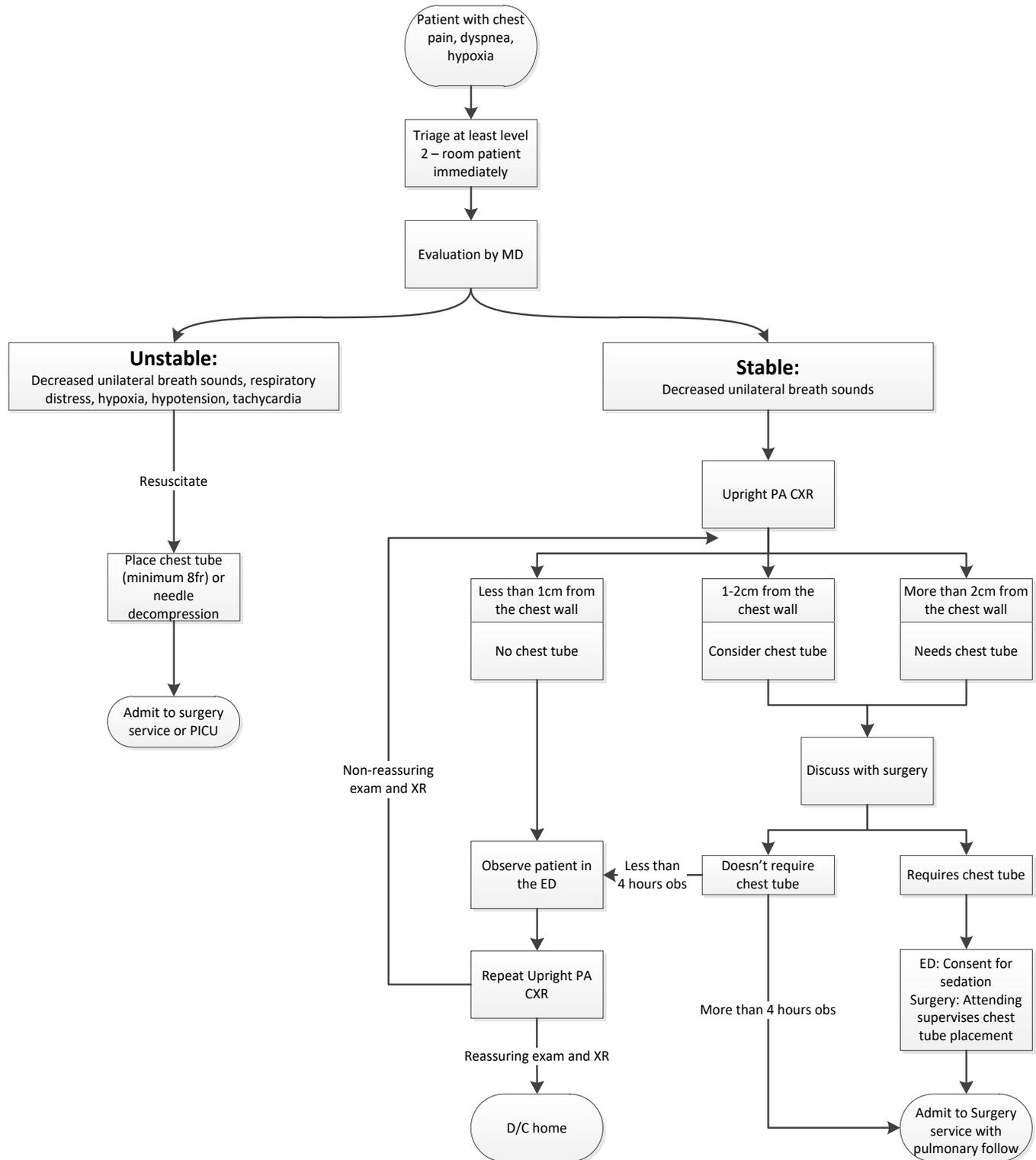


PEDIATRIC PRIMARY SPONTANEOUS PNEUMOTHORAX

For patients 1-21 years old

SUSPECTED PNEUMOTHORAX DIAGNOSTIC ALGORITHM



SUMMARY

EVALUATION

- History regarding presentation:
 - Document history of onset of chest pain or dyspnea
 - History of underlying lung disease
 - History of trauma
 - History of huffing, smoking, or breath holding
 - History of prior pneumothorax
- The unstable patient may present with:
 - Decreased unilateral breath sounds
 - Hypotension
 - Tachycardia
 - Hypoxia

LABORATORY STUDIES | IMAGING

- Laboratory studies
 - None indicated
- Imaging
 - Upright Posterior/Anterior (PA) chest X-ray (CXR)

TREATMENT

- Patient Stabilization in Emergency Department or Urgent Care
 - Resuscitate the unstable patient
 - If the patient is stable and the pneumothorax measures:
 - Less than 1cm – No chest tube
 - 1-2cm – Discuss insertion of a chest tube with surgery
 - Greater than 2 cm – Call surgery to insert a chest tube
- D/C from the emergency department if the observation period is less than 4 hours
- Admit to the Surgery service if the observation period is greater than 4 hours regardless if a chest tube was placed
- Consider Video Assisted Thoracoscopic Surgery (VATS) or underlying lung disease if the chest tube leak persists for more than 3 days

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TARGET POPULATION

Inclusion Criteria

- Patients 1-21 years old
- Patients with suspected spontaneous pneumothorax or proven spontaneous pneumothorax

Exclusion Criteria

- Patients less than 1 years old
- Patients older than 21 years old

BACKGROUND | DEFINITIONS

This guideline is intended for patients with primary spontaneous pneumothorax only. If underlying lung disease is suspected, the pulmonary service should be consulted and other treatment regimens should be considered. Surgical versus non-surgical treatment is controversial, with high rates of reoccurrence.

INITIAL EVALUATION AND CLINICAL MANAGEMENT IN THE ED/UC

Triage Assessment

- Vital signs (VS)
- History regarding presentation
 - Document history of onset of chest pain or dyspnea
 - History of underlying lung disease
 - History of trauma
 - History of huffing, smoking, or breath holding
 - History of prior pneumothorax
- Clinical interventions
 - Keep patient upright and NPO
 - Apply oxygen if hypoxic
 - Triage at least level 2
 - Place in room immediately for clinical evaluation

Monitoring

- VS per nursing protocol
- Cardiopulmonary monitoring
- Oxygen if patient is hypoxic

Fluids, Electrolytes, Nutrition

- NPO
- NS bolus if patient is unstable (decreased unilateral breath sounds, hypotensive, tachycardic, hypoxic)

Initial Clinical Exam

Evaluate airway, breathing, circulation

- If the patient is **unstable** with clinical concern for pneumothorax, resuscitate as needed
 - Administer 100% oxygen
 - 2 large bore IV catheters
 - NPO
 - IV fluid resuscitation
 - Using local anesthesia, place minimum size 8fr chest tube and/or needle decompression of chest if concern for tension pneumothorax
 - Admit to surgery service
- If the patient is **stable**, proceed to imaging (CXR) – Upright PA
 - If pneumothorax is identified, objectively gauge the size
 - Small pneumothorax (less than or equal to 1 cm of air between chest wall and lung): Chest tube is likely not necessary. Place on oxygen observe in the ED with plan to D/C if improved within 4 hours.
 - Moderate pneumothorax (1-2cm of air between chest wall and lung): Consider chest tube placement. Place on oxygen and discuss with surgery service. Keep NPO and prepare for moderate sedation.

- Large pneumothorax (greater than or equal to 2 cm of air between chest wall and lung): Patient will likely need a chest tube. Place on oxygen and discuss with the surgery service. Keep NPO and prepare for moderate sedation.
- If concerned for underlying lung disease consider a pulmonary consult.

Treatment in Stable Patient Who Requires Chest Tube for Primary Spontaneous Pneumothorax

- ED attending
 - Discuss the need for a chest tube with the surgery attending
 - Verbal consent for moderate sedation
 - Arrange and supervise the sedation following the 'Sedation Guidelines'
- Surgery attending
 - Will supervise placement of the chest tube by the ED/Peds/Surgery resident
 - Arrange for admission to surgery service

Laboratory Studies

- No empiric labs required

Medications

- No empiric antibiotics required
- Pain management
 - Scheduled NSAIDs and narcotics per ED discretion

MANAGEMENT OF THE PATIENT WITHOUT A CHEST TUBE^{2,3}

- Vital signs every 2 hours with pain score for the first 8 hours, then every 4 hours if stable
- Pulse ox and CR monitoring if the patient is ordered for opioid pain medication
- The list below may be signs of deterioration:
 - Tachycardia
 - Falling blood pressure
 - Increasing pain
 - Increasing dyspnea
- Use of 100% oxygen (AKA nitrogen washout) is controversial and not clearly shown to decrease the pneumothorax
- If narcotics are used, follow bowel regimen to prevent constipation and Valsalva maneuvers that can complicate pneumothorax
- Repeat upright PA CXR in 12-24 hours
- D/C criteria:
 - Stable for 24-48 hours and satisfactory pain control (preferably without narcotics)
 - PCP follow up ensured

MANAGEMENT OF THE PATIENT WITH A CHEST TUBE

- Consideration of Pulmonary consultation
 - Air leak should resolve within 3 days, but if not, consider consulting pulmonary for underlying lung disease
 - If patient's history indicates underlying lung disease then consult the pulmonary service
- Consideration of VATS⁴
 - Air leak persistent for > 3 days after initial thoracostomy tube management
 - Recurrent episode
 - Use of CT for decision making is provider dependent. CT findings have not been shown to be predictive of recurrence and CT will have a significant false negative rate for blebs⁵. CT has not been shown to be helpful in prophylactic management of contralateral findings.
 - If operative management is chosen, there is mixed data as to optimal approach⁶. Some data support pleurodesis (mechanical or chemical) combined with blebectomy reduces pneumothorax recurrence rate. Chemical pleurodesis is generally expected to cause more pain and have a longer length of stay.
 - Ketorolac does not reduce the effectiveness of pleurodesis⁷.

DISCHARGE INSTRUCTIONS

- There is a high rate of pneumothorax reoccurrence after VATS procedure or chest tube drainage. Close follow-up is recommended.
- Air Travel and scuba diving is discouraged for 48 hours post chest tube removal. Travel over mountain passes with caution due to low barometric pressure at high altitude.
- If narcotics are required, continue the bowel regimen after discharge.

Follow-up Instructions

- Follow-up with PCP and surgery clinic if VATS was performed.
- Follow-up with PCP within 1 week if discharged home without intervention.
- Follow-up in pulmonary clinic if underlying lung disease is suspected.

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- Clinical Care Guidelines & Measures Review Committee – May 10, 2016
- Medication Safety Committee –Not Applicable
- Antimicrobial Stewardship Committee –Not Applicable
- Pharmacy & Therapeutics Committee – Not Applicable

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REVIEW/REVISION SCHEDULE

Scheduled for full review on May 10, 2020

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