

Primary Spontaneous Pneumothorax Management (Adult)

Procedure

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TARGET AUDIENCE and SETTING

Applicable to all clinicians caring for patients at Monash Health with a primary spontaneous pneumothorax (PSP) (still to be discussed with stakeholders regarding patient age exclusions).

PURPOSE

The purpose of this procedure is to guide practice in the assessment and management of patients presenting to the Emergency Department with a PSP.

PRECAUTIONS/CONTRAINDICATIONS

- If a patient is clinically unstable, interventional management must be initiated
- Ensure patient is provided with patient information sheet and a letter to GP on discharge
- Ensure follow up appointments are booked
- Age <12 seek paediatric respiratory advice

STANDARD REQUIREMENTS

When undertaking any clinical interaction with a patient, staff are expected to;

- Perform routine hand hygiene. Refer to the [Hand Hygiene Procedure](#).
- Introduce themselves to the Patient and Carer/ Family if in attendance
- Check patient identification. Refer to the [Patient Identification Procedure](#).
- Obtain consent as per the [Consent to Medical Treatment Procedure](#).
- Keep the patient/carer informed and involve them in decision making.
- Document interaction in the electronic medical record or health record using black pen; including date, time, signature and designation.

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PROCEDURE

Initial Assessment

- Complete a thorough history and clinical examination including a full set of vital signs to confirm the diagnosis, and rule out red flags indicating life-threatening diagnoses such as myocardial infarction, pulmonary embolism, and aortic dissection.
- Assess for signs of clinical instability:
 - Systolic blood pressure* <90mmHg
 - Tachycardia HR>130* BPM
 - Tachypnoea RR>30*
 - Hypoxaemia SAT<92
 - Severe chest pain (unable to mobilise) or breathlessness

*Use age MET criteria if age <18 years

- Chest X-ray (CXR): an **inspiratory** film is recommended as an expiratory film increases exposure to radiation and also exaggerates the size of the pneumothorax (RCH guidelines, eTG)
- Rule out a traumatic pneumothorax, secondary spontaneous pneumothorax and tension pneumothorax
 - Tension pneumothoraces very rarely or never occur in patients with a PSP

Vital Signs

Complete and monitor a full set of vital signs including pain score as per [Monitoring Vital Signs in the Emergency Department Procedure](#).

If these are abnormal (heart rate [HR] less than 60 or more than 130 beats per minute, systolic blood pressure [BP] less than 90mmHg, respiratory rate [RR] more than 30, oxygen saturation less than 90% on room air) call the Medical Emergency Team (MET).

Diagnostic criteria

- The patient has no underlying lung disease and there is no evidence of precipitating events
- Acute onset of ipsilateral chest pain and dyspnoea
- Physical findings:
 - Small PSP: minimal physical findings
 - Large PSP: tachypnoea, reduced chest wall movement, decreased tactile fremitus, hyper-resonance on percussion, diminished/absent breath sounds, tracheal deviation to the opposite side, mediastinal shift
- No signs of clinical instability or tension pneumothorax
- CXR: the patient may be clinically stable but the CXR may show signs of radiological tension (flattening of the diaphragm, rib cage expansion, mediastinal shift)

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Management

- Once the patient has been assessed and the diagnosis of PSP confirmed, all patients with PSPs, irrespective of size, should be provided with pain relief (refer to the [PROMPT analgesia guidelines](#)).
- If the patient is hypoxaemic, supplemental oxygen should also be provided.
- Explain both conservative and interventional treatment to the patient, including the risks and benefits of each and the current evidence for both options to ensure shared clinical decision making occurs.
- Provide the patient with [Treatment Options for Primary Spontaneous Pneumothorax \(patient information sheet\)](#)
- **First-line management:**
 - Conservative management is first-line management, and should be started regardless of PSP size and provided the patient is clinically stable.
 - Continue giving the patient pain relief and supplemental oxygen if required
 - Admit to ED Short-Stay Unit (SSU)
 - Observe the patient and continue monitoring the patient's vital signs for a minimum of 4 hours
 - Perform a follow-up inspiratory CXR 4 hours after the patient's initial CXR to assess for enlargement of pneumothorax (note increasing sizes alone not an indication for intervention)
 - If the patient is clinically stable, their symptoms have improved or resolved and they are ambulating, the patient can be discharged.
- **Second-line management:**
 - Interventional management is second-line management and should be initiated if the patient is clinically unstable, or has symptoms that cannot be resolved after symptomatic treatment (e.g. ongoing chest pain). Refer to procedure on how to insert an intercostal catheter [Management of Pleural and Mediastinal Drain Tubes \(Adult\)](#) and [Pneumothorax \(spontaneous\) Short Stay Unit/Extended Care Unit Admission \(Adult\)](#)
 - Insert a small-bore (≤ 12 French) Seldinger-style chest tube and attach it to an underwater seal, without suction
 - Obtain a CXR 1 hour later
 - If the lung has re-expanded and the underwater drain no longer bubbles, the drain can be closed with the use of a three-way stopcock.
 - 4 hours later, if the patient's condition is stable and a repeat CXR showed that the pneumothorax had not recurred, the drain can be removed and the patient can be discharged.
 - If the initial drain insertion has not resulted in resolution on CXR (often called radiographic resolution) or if the pneumothorax recurs under observation, open the stopcock, recommence the underwater seal drainage, and admit the patient to hospital.

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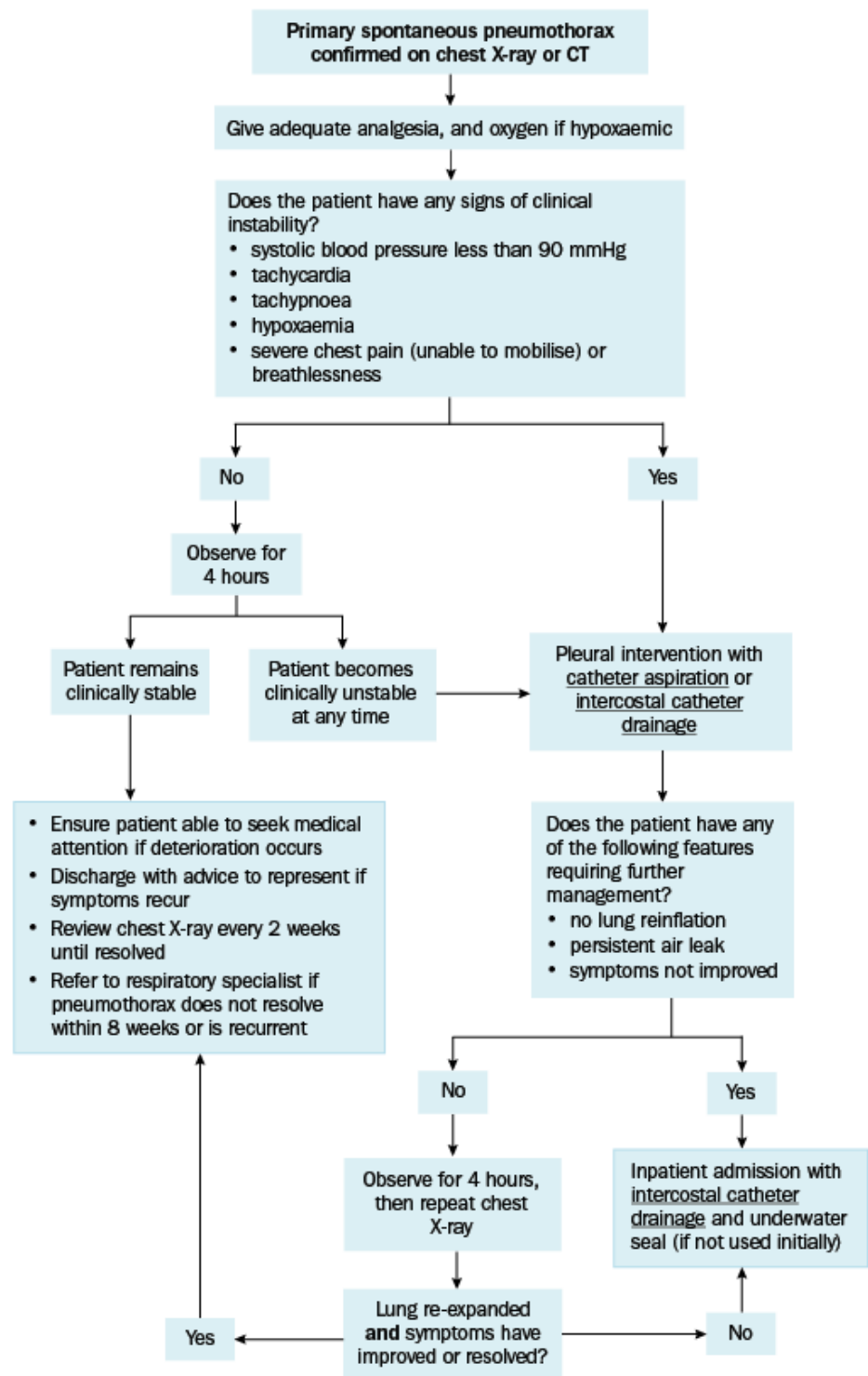
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The following flowchart outlines the general initial assessment and management of PSP in adult patients in the ED (Reproduced with permission from Management of primary spontaneous pneumothorax [published 2020 Dec]. In: eTG Complete [digital]. Melbourne: Therapeutic Guidelines Limited, 2021 Mar. <<https://www.tg.org.au>>)⁸



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Discharge

- Home discharge criteria:
 - Improved clinical condition
 - Stable vital signs
 - Initial assessment and discharge summary complete on EMR
 - Discharge prescription, patient information, certificate and letter to GP have been provided to the patient
 - Ensure all allergies are recorded in EMR
- Post-discharge:
 - The patient must be seen by their GP within 24-72 hours post-discharge to monitor for ongoing or recurring symptoms and clinical instability.
 - Follow-up inspiratory CXRs should be requested 2 weekly to monitor lung re-expansion (this may take 8 weeks for large PSP)
 - If no change in PSP size at 2 weeks GP should refer back for urgent respiratory review via the emergency department
 - The patient needs to attend outpatient appointments at Monash Health Respiratory Clinic at **6-8 weeks** [Respiratory to advise]

RELATED DOCUMENTATION

- [Conservative management of PSP clinical guidelines](#)
- [Pneumothorax \(spontaneous\) Short Stay Unit/Extended Care Unit Admission \(Adult\)](#)
- [Management of Pleural and Mediastinal Drain Tubes \(Adult\)](#)
- [PSP patient information and Letter to GP](#)

BACKGROUND

The incidence of primary spontaneous pneumothorax (PSP) is roughly 7.4/100,000 in men and 1.2/100,000 in women annually in the United States and is more common in males¹. The management of PSP varies in international guidelines depending on factors such as clinical features and the size of the PSP; the British Thoracic Society guidelines recommend management according to symptoms and advise simple aspiration should be first-line for all PSPs that require intervention², which is further supported by the European Respiratory Society task force statement which states that management for all first-episode PSPs should be driven by symptoms rather than size³. However, the American College of Chest Physicians guidelines state simple aspiration has no role and first-line treatment should be insertion of an intercostal catheter for large pneumothoraces⁴. Chest tubes for treatment of PSP became standard treatment in the late 1950s, but a study by P. Stradling and G. Poole in 1966 concluded that a conservative approach and outpatient management can successfully treat the majority of PSPs with no further intervention⁵. A Cochrane review performed in 2014 aimed to compare clinical outcomes of conservative vs interventional management of PSPs in adults, but there was a lack of high-quality evidence to review with the conclusion that existing guidelines are not based on evidence but on expert consensus⁶.

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In 2020, a large multicentre randomised controlled trial by Brown et al⁷ and a systematic review and meta-analysis by Lee et al⁸ were published, with both concluding that conservative treatment is non-inferior to intervention for the management of all PSPs, regardless of size, in terms of resolution, recurrence and other secondary outcomes such as length of hospitalisation. Additionally, adverse events are far less in patients who receive conservative management as adverse events are usually related to the insertion or maintenance of a chest tube in-situ. In the trial by Brown et al., the mean size of PSPs in the conservative group was 63.6% $\pm$ standard deviation of 23.4%, and 94.4% of these patients had full resolution of their PSP by 8 weeks post-presentation without interventional management being initiated. This included patients with complete pneumothoraces with 'radiological' tension but without evidence of physiological tension, who received conservative management and recovered fully.

Therapeutic Guidelines has incorporated this evidence into their recommendations for the management of PSP and recommends all PSPs, regardless of size, should initially be managed conservatively with analgesia, and supplementary oxygen if the patient is hypoxaemic⁹. This guideline has been produced in line with current evidence and Therapeutic Guidelines recommendations.

DEFINITIONS (optional)

Conservative management: where the patient is treated with observation alone, with analgesia and supplemental oxygen if required.

Pneumothorax: the presence of gas between the parietal and visceral pleura.

Primary spontaneous pneumothorax (PSP): refers to a pneumothorax that occurs in a patient without an underlying lung disease (e.g. chronic obstructive pulmonary disease) and without a precipitating external event

Secondary spontaneous pneumothorax: refers to a pneumothorax that occurs in a patient **with** an underlying lung disease e.g. COPD, and without a precipitating external event

Traumatic pneumothorax: pneumothorax caused by blunt or penetrating thoracic trauma

Tension pneumothorax: a **medical emergency** with rapid-onset large pneumothorax occurring in a clinically unstable patient e.g. with symptoms including severe breathlessness, hypoxaemia, hypotension, cardiovascular collapse.

ED: Emergency Department

CXR: Chest X-Ray

RR: Respiratory Rate

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HR: Heart Rate

BP: Blood Pressure

MET: Medical Emergency Team

KEY STANDARDS, GUIDELINES OR LEGISLATION

- Therapeutic Guidelines

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KEYWORDS

Primary spontaneous pneumothorax, PSP

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