

Inclusion Criteria:

- Imaging diagnosis of pneumomediastinum

Exclusion Criteria:

- Trauma meeting trauma-alert criteria
- Immunocompromised
- Recent thoracic or cardiac surgery
- Patients on mechanical ventilation
- Underlying chronic lung disease such as CF

Signs/Symptoms:

- Acute onset chest pain
- Shortness of Breath
- Coughing
- Forceful Vomiting
- SQ Emphysema

*High Risk Features:

- Fever
- Hemodynamic instability
- Persistent forceful vomiting
- Severe dysphagia, odynophagia
- Abdominal tenderness
- Pleural effusion present
- Leukocytosis (if CBC obtained, NOT required)

Predisposing Conditions

- Asthma
- Lower Respiratory Infection
- Valsalva during cough or vomiting
- Heavy lifting
- Minor fall or blunt impact to the chest

Signs and Symptoms Concerning for Pneumomediastinum

PA/Lat CXR

Pneumomediastinum present?

No → Off Pathway

Yes

*High Risk Features?

- Transfer to MCED if not already
- Consult Pediatric Surgery

No

Treat Symptoms as indicated:

- Pain medication (NSAID first line treatment)
- Albuterol if asthma is a cause
- Antiemetic medication

Observe and re-evaluate

Admit to appropriate service

- Consider underlying disease for appropriate admission service

Consider additional imaging as indicated

Initial Management

- NPO
- Broad Spectrum Antibiotics if indicated (Consider piperacillin-tazobactam vs. piperacillin-tazobactam, vancomycin, & gentamicin)

Resolution of Symptoms:

- Determine outpatient symptom management
- Follow-up w/PCP in 2-3 days
- Provide indications for return to ED

Symptoms persistent?

No

Yes

- Consider additional imaging (CT chest, esophagram) at direction of Pulmonary Medicine

ED Discharge Criteria:

- Symptoms managed/resolving
 - Tolerating liquids
- Discharge Planning

Admit to Pulmonology/Hospital Pediatrics

- Symptom Management
- Consider Pediatric Surgery consult if high-risk features develop

Pre-Pathway Validation

Is this Spontaneous Pneumomediastinum (SPM)? SPM is the presence of air in the mediastinum, not from major trauma, iatrogenic injury during surgery, or mechanical ventilation.

Typical presentation (1-3):

- Acute onset chest pain (55%)
- Dyspnea (40%)
- Cough (32%)
- Neck Pain (17%)
- Odynophagia (14%)
- Dysphagia (10%)

Diagnostic Criteria for Spontaneous Pneumomediastinum .

- PA/Lateral CXR

Consider other alternate clinical problems and diagnoses when:

- None of the diagnostic criteria are met.

Consider a diagnostic timeout ("What else could this be?") or using a diagnostic checklist.



Pathway Inclusion Criteria

- Presence of air in the mediastinum on chest x-ray or CT scan

Pathway Exclusion Criteria

- Traumatic mechanism meeting trauma alert criteria
- Immunocompromised
- Recent thoracic or cardiac surgery
- Patients on mechanical ventilation
- Underlying chronic lung disease such as CF



Diagnostic Timeout

Red Flags

- Hemodynamic instability
- Fever
- Abdominal pain, peritonitis
- Leukocytosis
- Presence of pleural effusion
- Recurrent or forceful emesis
- Severe dysphagia, odynophagia
- Desaturation



Diagnostic Timeout

Differential Diagnosis

- Spontaneous pneumomediastinum
- Secondary pneumomediastinum
- Spontaneous pneumothorax

[Differential Diagnoses](#)



Admission Criteria

- **Presence of High Risk Features:** Fever, Hemodynamic Instability, Desaturation, Recurrent or forceful vomiting, Severe dysphagia, Severe odynophagia, Abdominal tenderness, Pleural Effusion present, or Leukocytosis
- No improvement in symptoms after treatment and/or observation

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Discharge Planning

- First occurrence and discharged from the ED: follow up with PCP in 2-3 days
- If patient has return to ED but is not hospitalized - call Pulmonary Medicine and set up a follow up in 1-2 weeks
- Follow-up after hospitalization to be determined by the primary service

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Patient & Caregiver Education

- **Provide activity restrictions to be followed until seen in follow-up:**
 - Avoid high-risk behavior such as strenuous athletic activities, scuba diving, weight lifting, and playing wind instruments.
 - There is a paucity of literature regarding return to activity, but generally, patients should be asymptomatic before returning and follow a progression from light activity, no vigorous non-contact to contact)
 - Paroxysmal coughing, screaming, and crying may all result in pneumomediastinum.
 - Inhalation of both legal drugs (cigarettes) and illicit drugs (eg, cocaine, marijuana) should be avoided.
- **Provide patient education documents including indications for return to the ED:**
 - Temperature 100.8F or higher
 - Worsening chest pain not resolved by prescribed medications
 - Shortness of Breath
 - Forceful Vomiting

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Diagnostic Testing

- ***Chest X-ray AP/Lateral including the cervical region*** is recommended to identify mediastinal air. It may be the only test needed in the majority of patients with spontaneous pneumomediastinum (SPM). Studies have demonstrated that subsequent imaging is very unlikely to alter care decisions.
- ***Chest CT*** may be useful for evaluation of certain patients with known or suspected underlying lung disease.
- ***Ultrasound of the thorax*** is ***not recommended*** to evaluate for SPM as the diagnostic criteria are not well established and the utility with hyperinflation is limited.
- **Esophagram** and **esophagoscopy** are ***not recommended*** to evaluate for esophageal perforation in patients with SPM.
- **Bronchoscopy** is ***not recommended*** to evaluate for tracheal/bronchial perforation in patients with SPM.
- **Electrocardiography (ECG)** is not necessary for evaluation of SPM but may be performed to rule out cardiac causes of chest pain. SPM itself may cause mild ST elevation and T-wave inversion.⁴

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Metrics

Pathway Goal

- This is a standardized care pathway for pneumomediastinum with a goal to decrease unnecessary admissions and unindicated advanced imaging (Chest CT, esophagram).

Quality Measures

- Hospital admission rate
- Hospital readmission rate
- Re-presentation to ED

Outcome Metrics

- Goal to decrease the number of unnecessary admissions and unindicated advanced imaging (Chest CT, esophagram)
- Goal to decrease the number of advanced imaging (CT, esophagram)

Process Metrics

- Pathway Utilization

Balancing Metrics

- 7 days re-presentation to ED or readmission

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References

1. Roby K, Barkach C, Brahmandam P, et al. Spontaneous pneumomediastinum is not associated with esophageal perforation: results from a retrospective, case-control study in a pediatric population. *Arch Pediatr Adolesc Med*. Published online November 2024. doi:10.1177/00099228231166997.
2. Morgan CT, Kanne JP, Lewis EE, Maloney JD, DeCamp MM, McCarthy DP. One hundred cases of primary spontaneous pneumomediastinum: leukocytosis is common, pleural effusions and age over 40 are rare. *J Thorac Dis*. 2023;15(3):1155-1162. doi:10.21037/jtd-22-1136
3. Aujayeb A. Patient centred care for spontaneous pneumomediastinum: a step in the right direction. *J Thorac Dis*. 2023;15(3):964-966. doi:10.21037/jtd-22-1668
4. Fitzwater JW, Silva NN, Knight CG, Malvezzi L, Ramos-Irizarry C, Burnweit CA. Management of spontaneous pneumomediastinum in children. *J Pediatr Surg*. 2015;50(6):983-986. doi:10.1016/j.jpedsurg.2015.03.024

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Pathway Team & Process

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Clinical Pathway Development

This clinical pathway was developed using the process described in the NCH Clinical Pathway Development Manual Version 6, 2022. Clinical Pathways at Nationwide Children's Hospital (NCH) are standards which provide general guidance to clinicians. Patient choice, clinician judgment, and other relevant factors in diagnosing and treating patients remain central to the selection of diagnostic tests and therapy. The ordering provider assumes all risks associated with care decisions. NCH assumes no responsibility for any adverse consequences, errors, or omissions that may arise from the use or reliance on these guidelines. NCH's clinical pathways are reviewed periodically for consistency with new evidence; however, new developments may not be represented, and NCH makes no guarantees, representations, or warranties with respect to the information provided in this clinical pathway.

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