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The 4th AAPCHS
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Seoul Dragon City Hotel

# Epidemiology of Spontaneous Pneumothorax

# : The Real World

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# Introduction

# Definition

- Pneumothorax : presence of air in the pleural space
    1. Communication between alveolar and pleura space
    2. Communication between atmosphere and pleura space
    3. Presence of gas-producing organisms

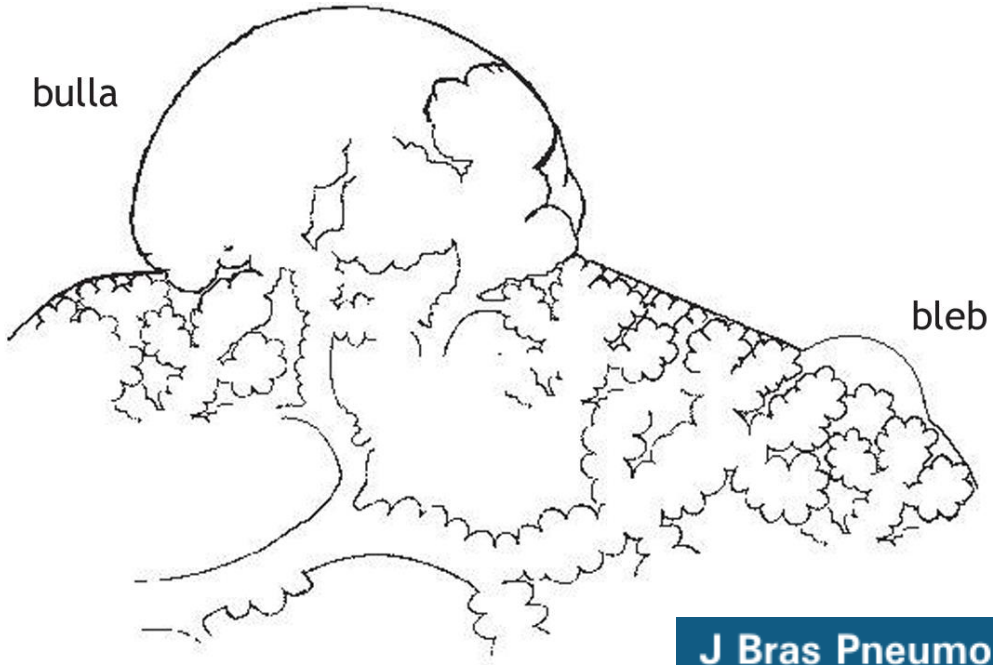
# Classification

- Spontaneous
  - ✓Primary : with no apparent underlying lung disease
  - ✓Secondary : with apparent underlyning lung disease
    - ➢Catamenial
    - ➢Neonatal
- Traumatic
  - ✓Iatrogenic/noniatrogenic

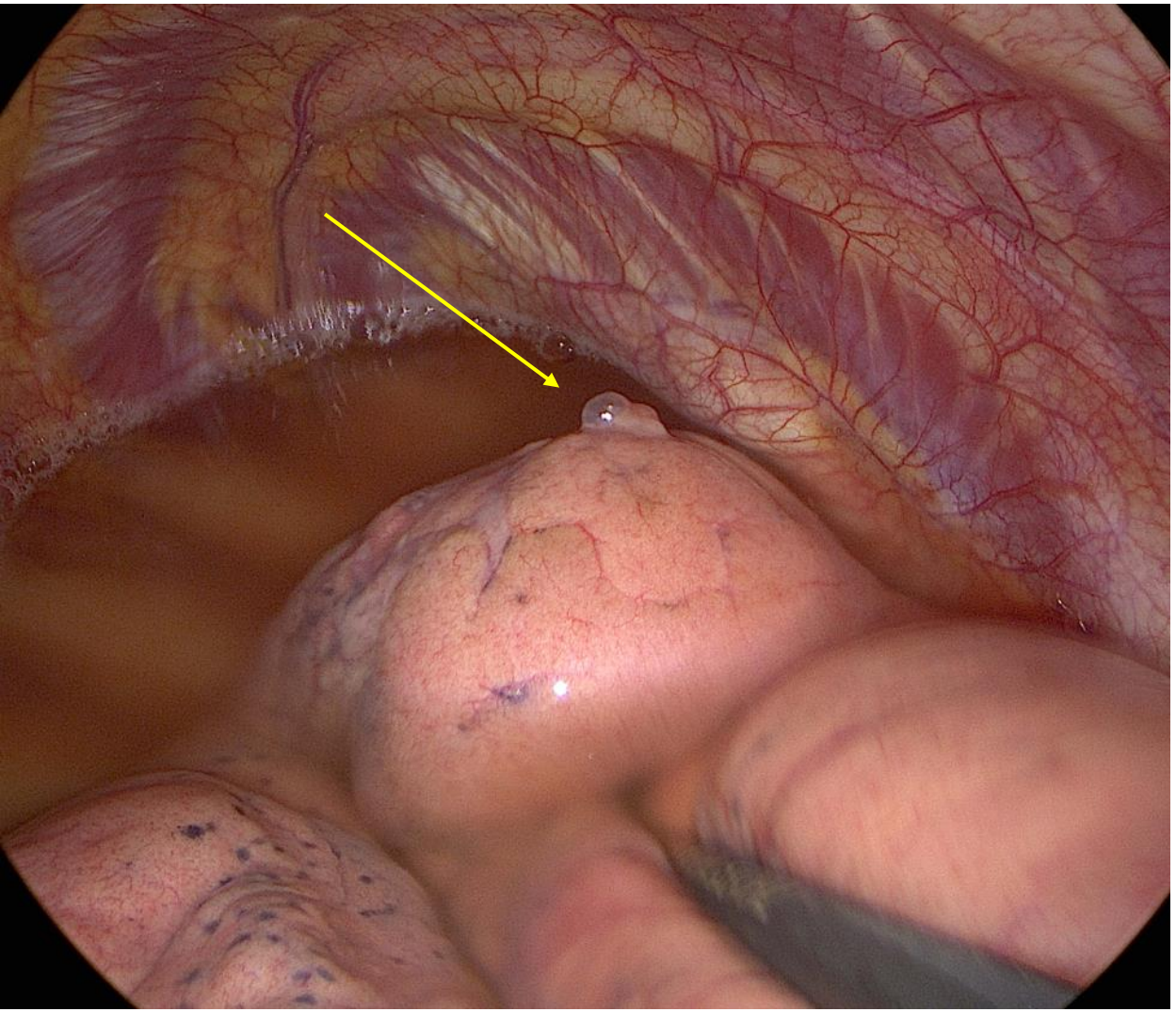
# Primary Spontaneous Pneumothorax (PSP)

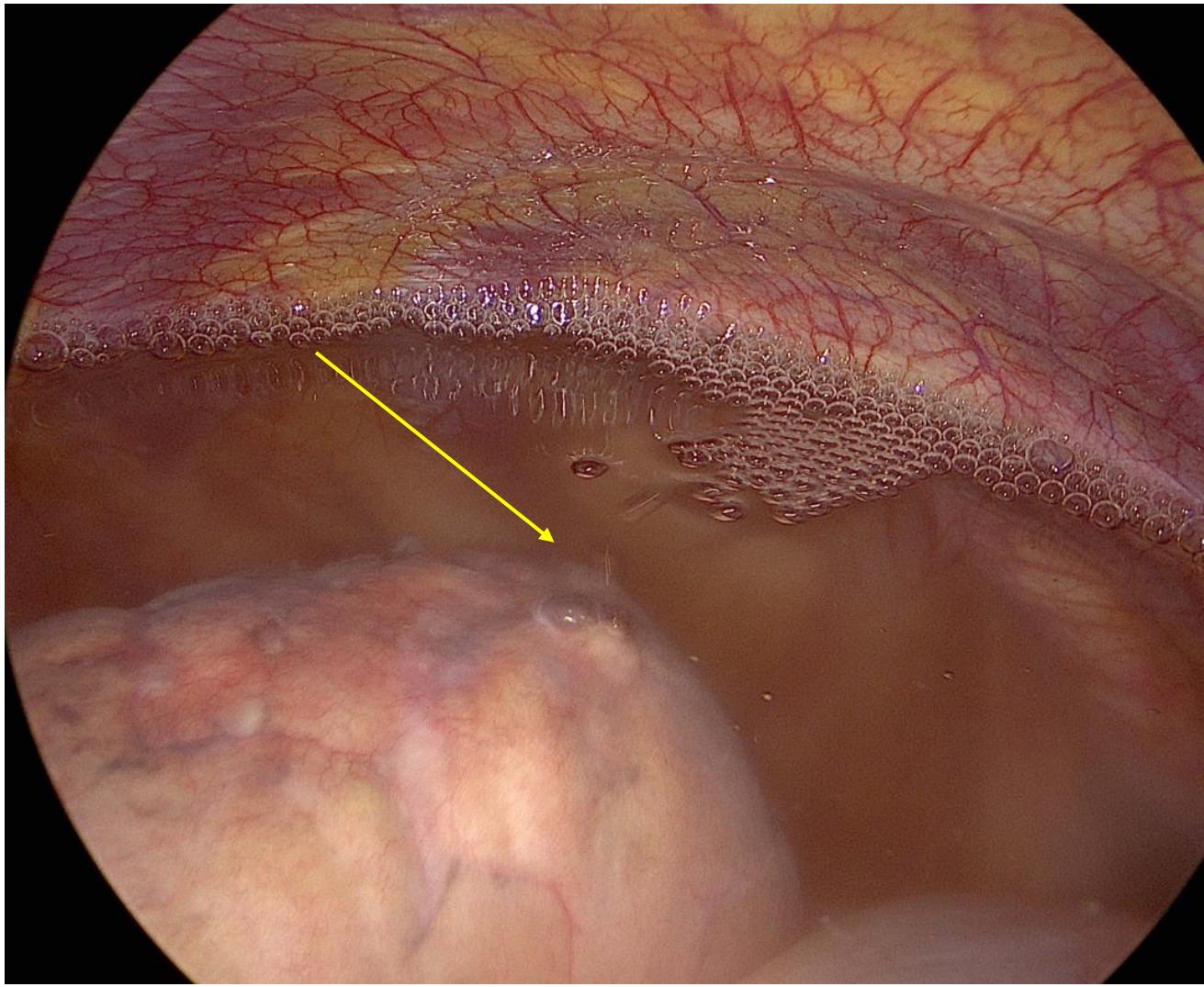
- Spontaneous rupture of subpleura bleb or bullae
  - ✓3.6%~73% seen during operation

(Noppen M. *Curr Opin Pulm Med* 2003;9(4):272-5.)

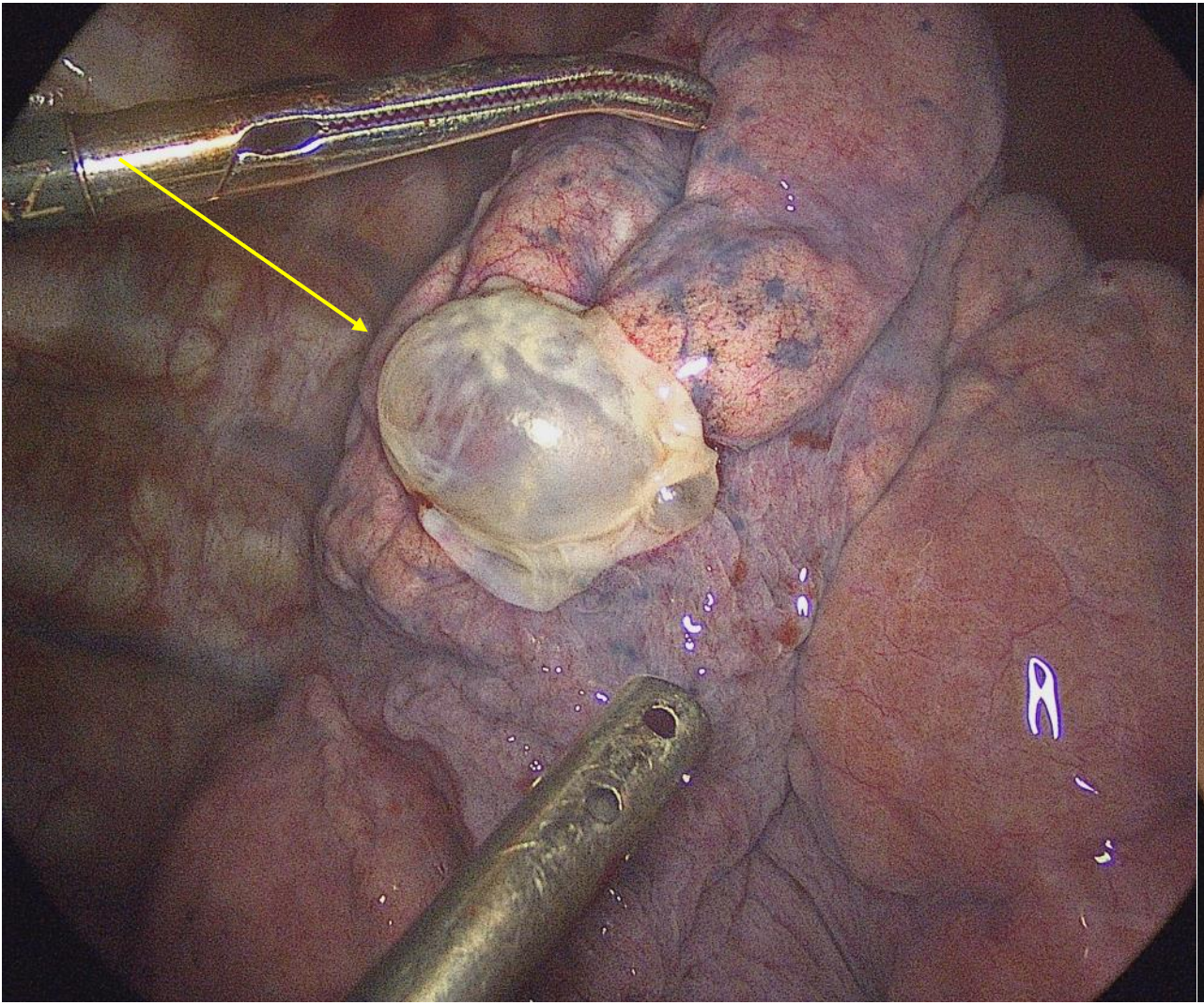


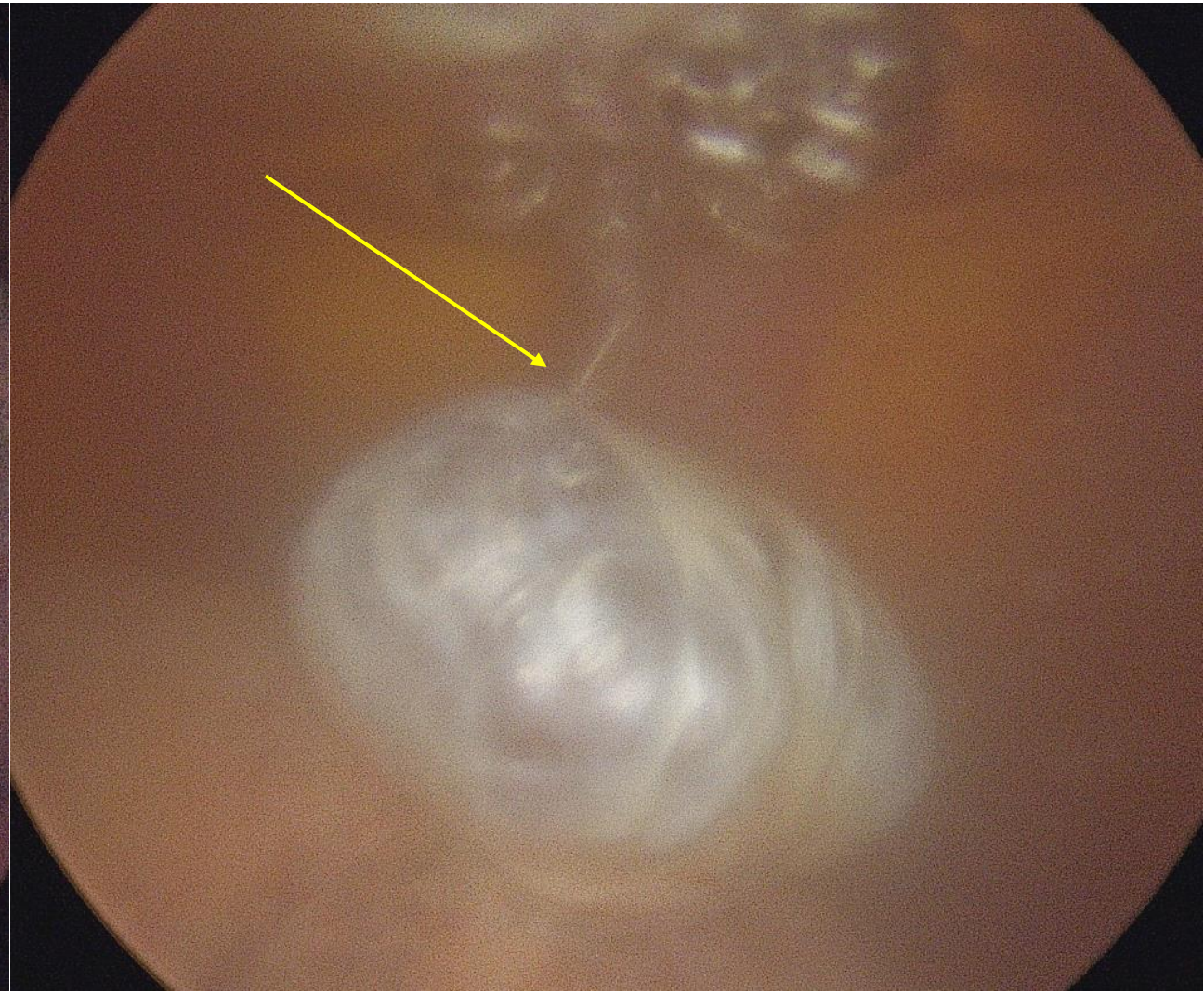

J Bras Pneumol. 2016;42(3):222-226





Male, 17 years old



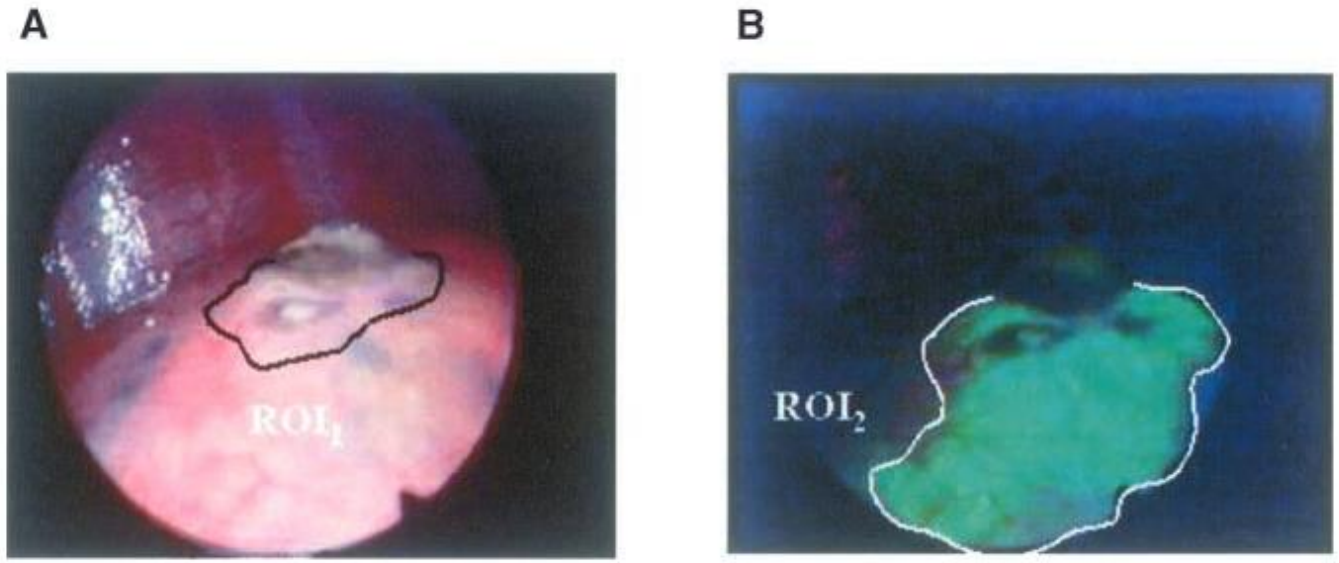


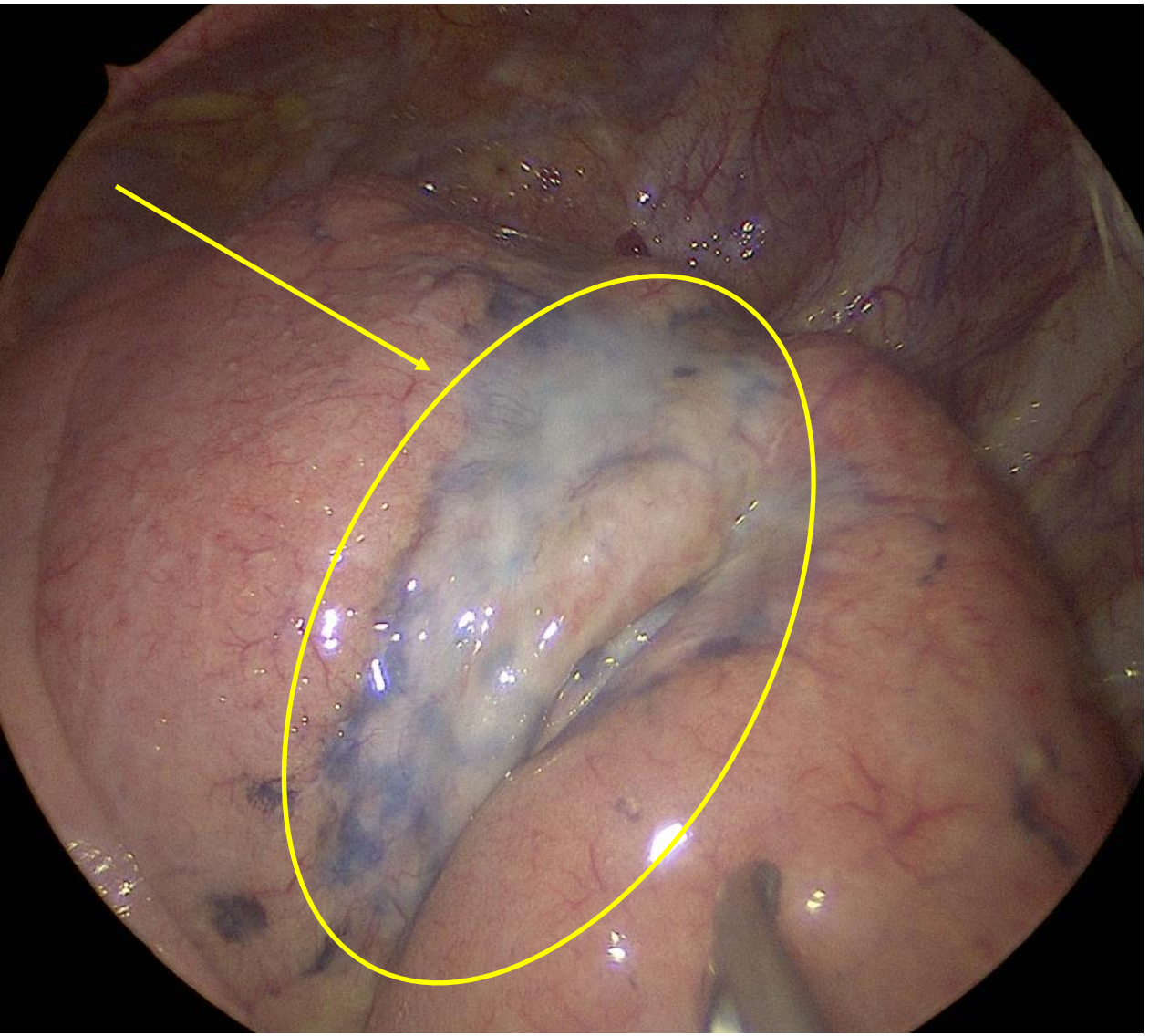
Male, 34 years old

# Primary Spontaneous Pneumothorax (PSP)

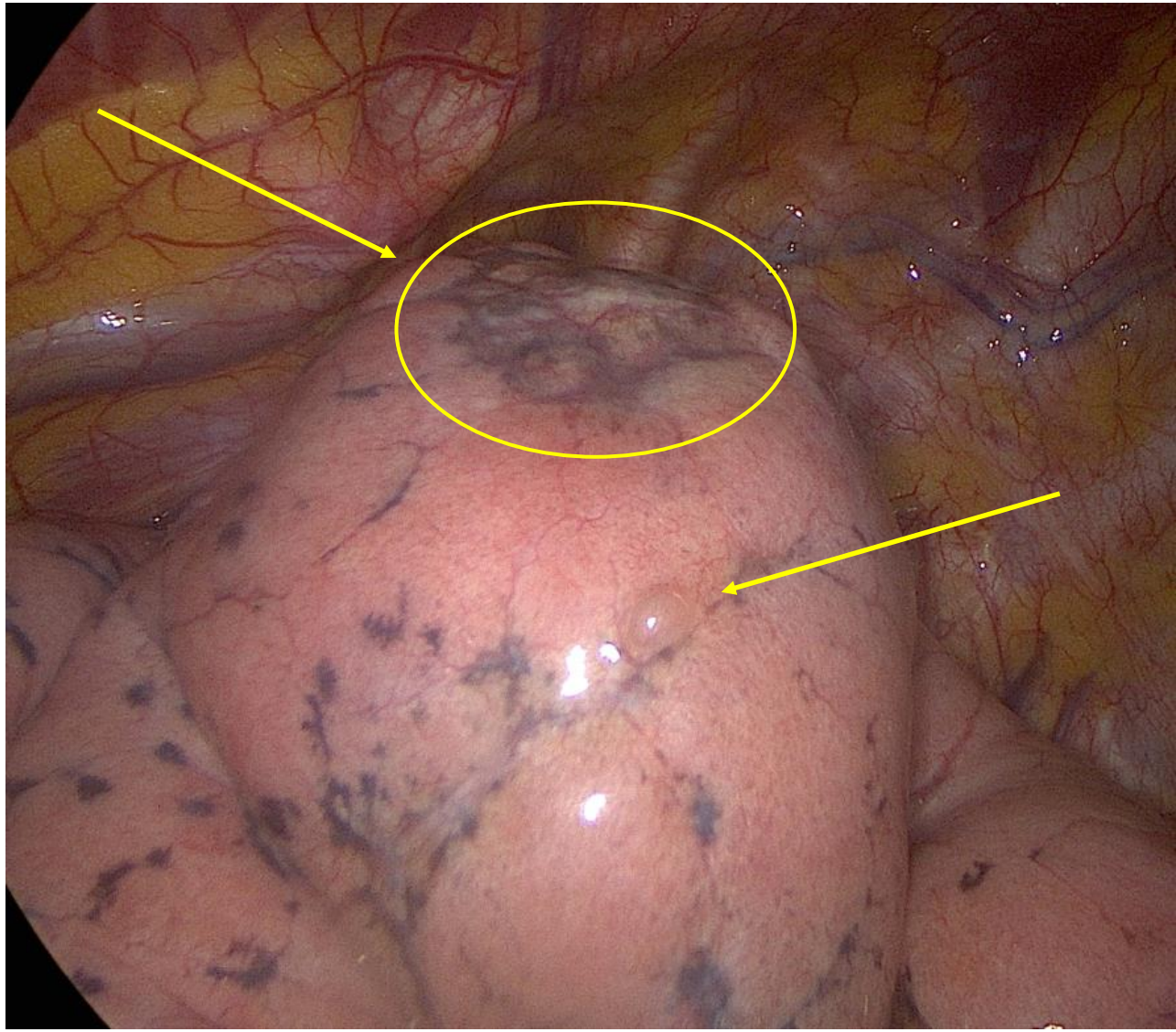
- Pleural porosity
  - ✓disruptiopn of mesothelial cell → inflammatory elastofibrotic layer → increased porosity

(Noppen M. *Am J Respir Crit Med.* 2006;26-30.)





Male, 19 years old



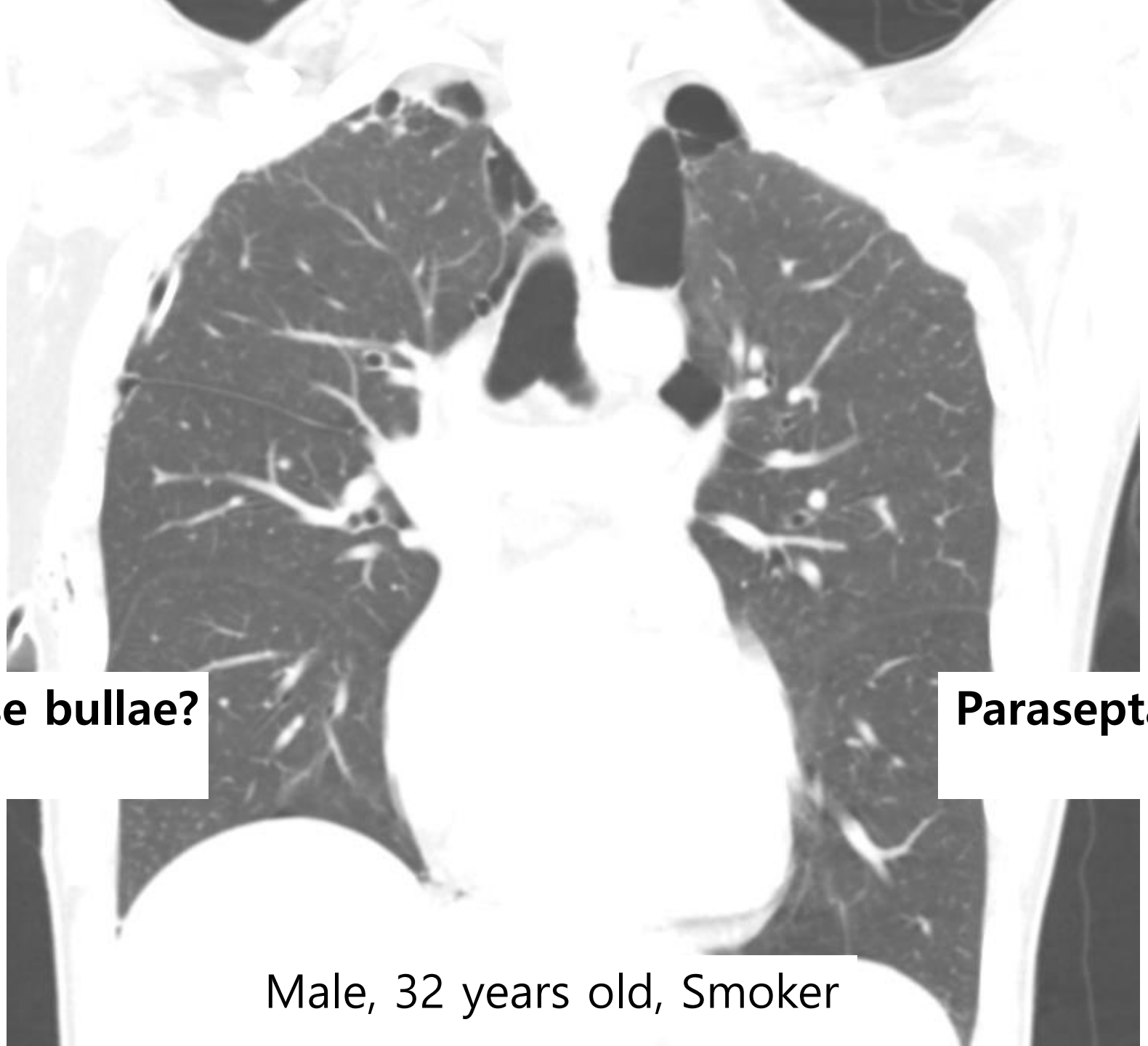
Male, 24 years old

# Risk factor of PSP

- Younger age
- Male gender
- Thin, tall, lower BMI
- Smoking
- Air pollution…

# Secondary Spontaneous Pneumothorax (SSP)

- Chronic obstructive pulmonary disease
- Tuberculosis
- Diffuse cystic lung disease
  - ✓ Lymphangioleiomyomatosis
  - ✓ Pulmonary Langerhans cell histocytosis
  - ✓ Birt-Hogg-Dube syndrome
  - ✓ Lymphophocytic interstitial pneumonia
- Pulmonary infection
  - ✓ Bacterial pneumonia
  - ✓ *Pneumocystis jirovecii* pneumonia
  - ✓ Covid-19 pneumonia
- Others
  - ✓ Cancer
  - ✓ Sarcoidosis
  - ✓ Interstitial lung disease



**Multiple diffuse bullae?**
**PSP?**

**Paraseptal emphysema?**
**SSP?**

Male, 32 years old, Smoker

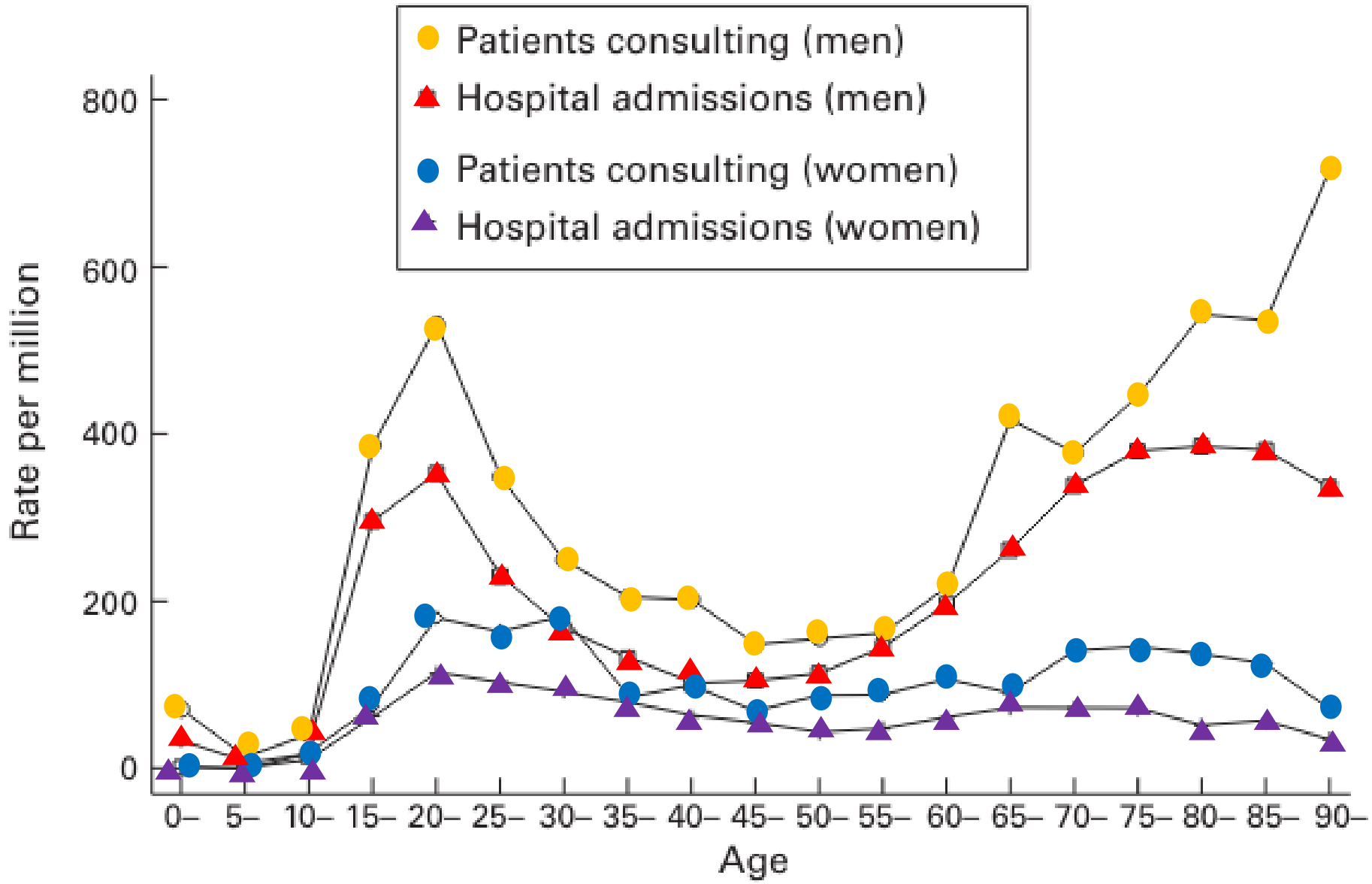
# Explore of Epidemiologic Studies

# Epidemiology of pneumothorax in England

Dheeraj Gupta, Anna Hansell, Tom Nichols, Trinh Duong, Jon G Ayres, David Strachan

*Thorax* 2000;**55**:666–671

- The first large scale epidemiologic study
- 1991-1995
- N=22,749 ➔ spontaneous pneumothorax
- GP consultation, ER admission




**Incidence of SP**

**Men : 24.0/100,000**

**Women : 9.8/100,000**

JAMA | Original Investigation

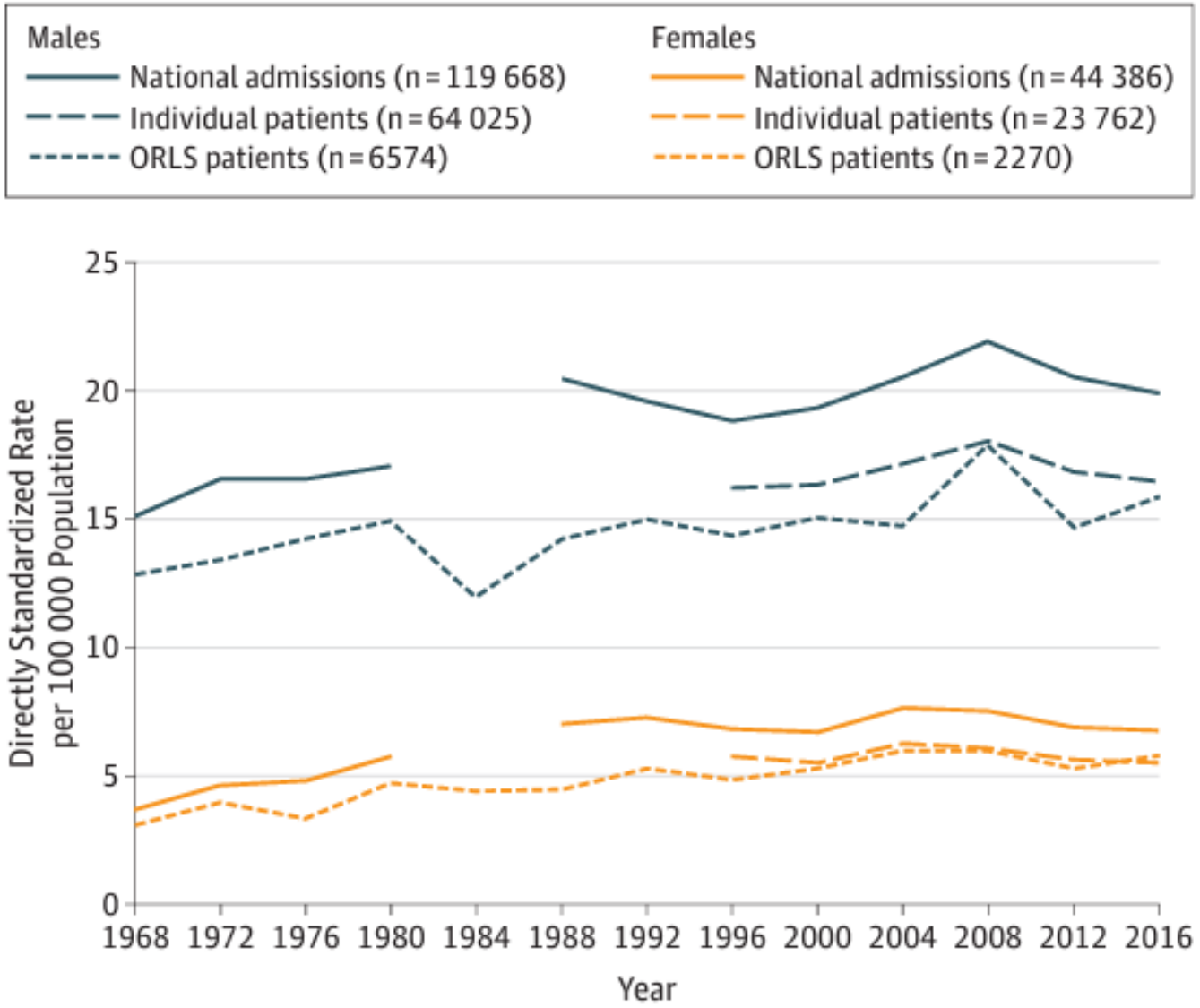
# Trends in the Incidence and Recurrence of Inpatient-Treated Spontaneous Pneumothorax, 1968-2016

Rob J. Hallifax, PhD; Raph Goldacre, MSc; Martin J. Landray, PhD; Najib M. Rahman, PhD; Michael J. Goldacre, MD

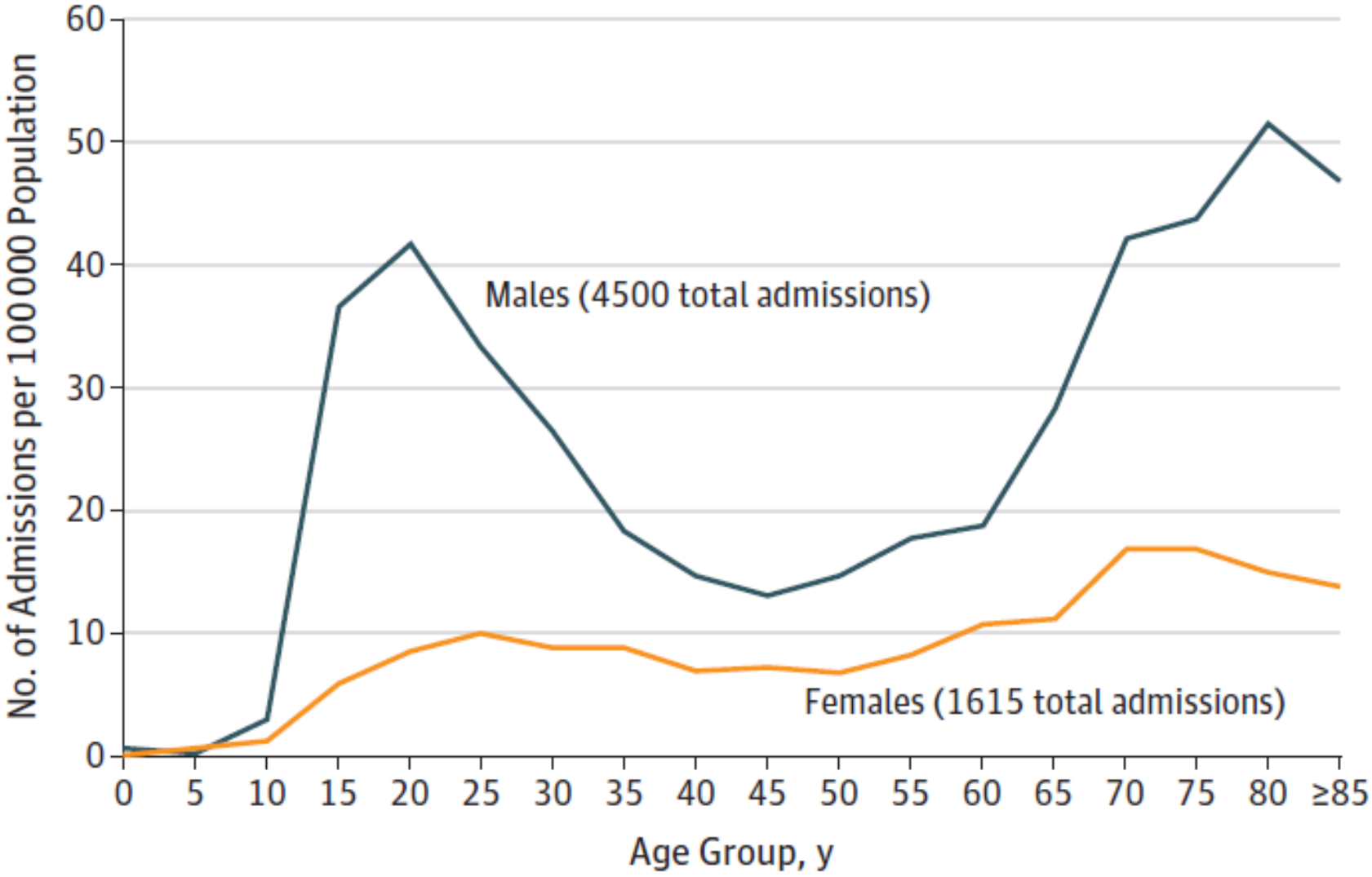
*JAMA*. 2018;320(14):1471-1480. doi:10.1001/jama.2018.14299

- 1968-2016, N=170,929 ➔ incidence trend
- 2015, N=6372 ➔ PSP, SSP
- Hospital admission

## Figure 4. Age-Standardized Hospitalization Rates for Spontaneous Pneumothorax in England (National Data; Record-Linked From 1999 only) and ORLS (Regional Data; Record-Linked From 1968) by Sex



## Figure 2. Spontaneous Pneumothorax Admissions by Age-Specific Population in England, 2015



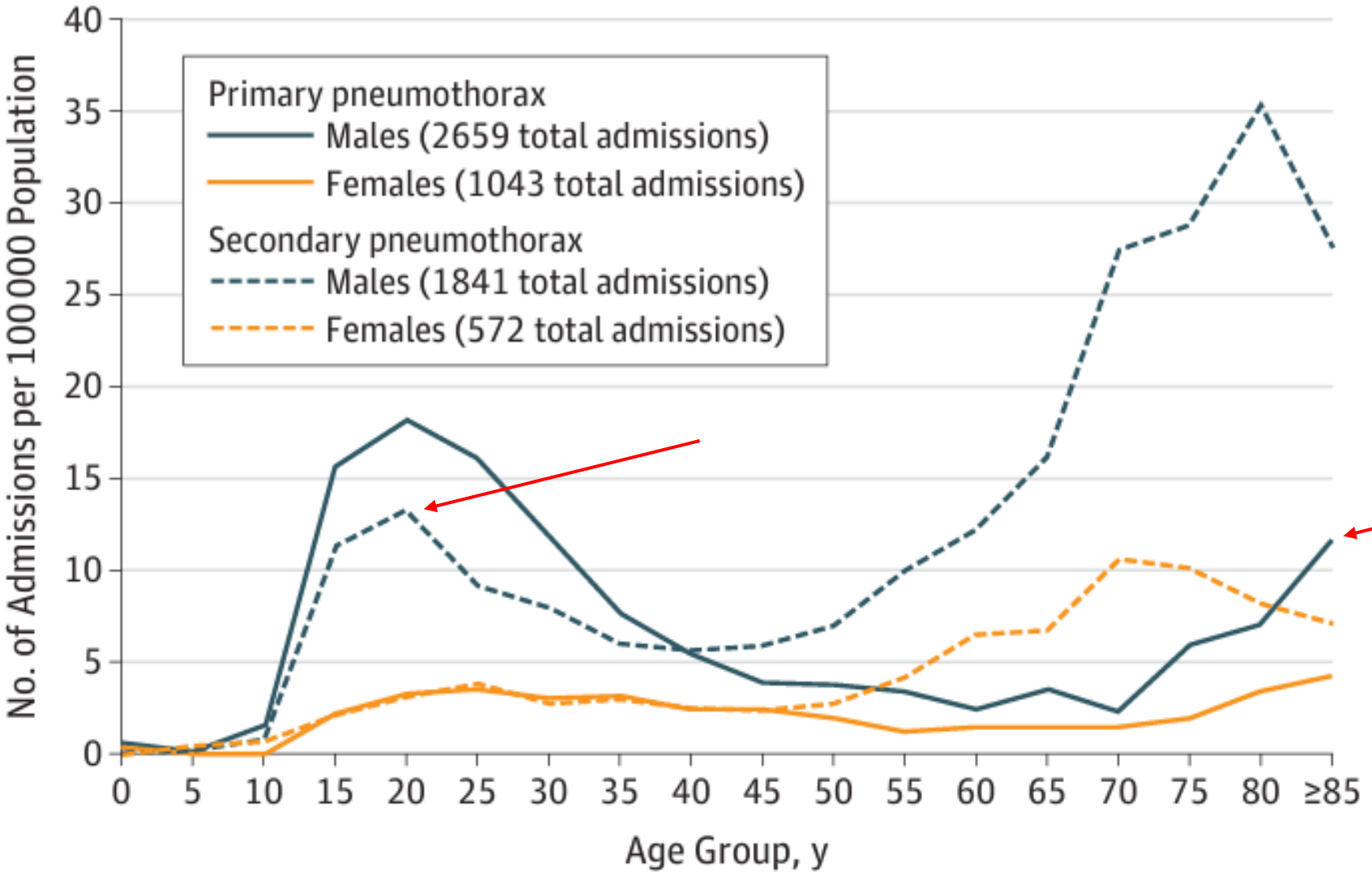

The ratio of male:female

=> 2.8:1

Table 2. Percentage Distribution of Comorbidities Among Secondary Spontaneous Pneumothorax Admissions, England 2015

| | | Distribution of Respiratory Comorbidities, %[b] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Secondary Pneumothorax Admissions (% of Total)[a] | COPD/ Emphysema | Asthma | Interstitial Lung Disease | Malignancy | Tuberculosis | Sarcoidosis | Cystic Fibrosis |
| **Male, by Age Group, y** | | | | | | | | |
| 15-34 | 754 (40.3) | 71.9 | 41.2 | 6.6 | 0.1 | 0.8 | 0.8 | 1.2 |
| 35-49 | 320 (51.2) | 74.1 | 40.6 | 10.0 | 3.1 | 0.6 | 2.2 | 0.9 |
| 50-64 | 468 (74.4) | 84.2 | 31.4 | 10.7 | 13.0 | 2.6 | 0.9 | 0.0 |
| ≥65 | 1101 (83.3) | 87.6 | 28.2 | 22.2 | 16.3 | 0.6 | 0.6 | 0.2 |
| Overall | 2643 (59.4) | 80.9 | 34.0 | 14.2 | 9.5 | 1.0 | 0.9 | 0.5 |
| **Female, by Age Group, y** | | | | | | | | |
| 15-34 | 211 (49.4) | 53.6 | 55.0 | 6.6 | 1.9 | 2.8 | 0.0 | 0.9 |
| 35-49 | 145 (49.5) | 57.2 | 51.0 | 6.9 | 12.4 | 0.0 | 0.0 | 0.0 |
| 50-64 | 219 (73.5) | 84.5 | 35.6 | 9.6 | 17.8 | 0.0 | 0.5 | 0.0 |
| ≥65 | 451 (78.8) | 79.4 | 38.6 | 18.6 | 24.8 | 1.8 | 1.3 | 0.0 |
| Overall | 1026 (64.5) | 72.0 | 43.1 | 12.6 | 16.9 | 1.4 | 0.7 | 0.2 |

## Figure 3. Primary and Secondary Spontaneous Pneumothorax Admissions by Age-Specific Population And Sex in England, 2015




The ratio of male:female

PSP ➔ 2.5:1

SSP ➔ 3.2:1

# Epidemiology of spontaneous pneumothorax: gender-related differences

Antonio Bobbio,[1] Agnès Dechartres,[2,3,4] Samir Bouam,[5] Diane Damotte,[4,6] Antoine Rabbat,[7] Jean-François Régnard,[1,4] Nicolas Roche,[4,7] Marco Alifano[1,4]

Bobbio A, *et al*. *Thorax* 2015;**70**:653–658.

- 2008-2011
- Hospital admission ➔ 59,637
- N=42,595
- PSP, SSP

# Tabular List of Diseases: J93.12

Legend

## CHAPTER 10: Diseases of the respiratory system (J00-J99)

### Other diseases of the pleura (J90-J94)

J93 Pneumothorax and air leak

- **J93.0 Spontaneous tension pneumothorax**
- J93.1 Other spontaneous pneumothorax
  - **J93.11 Primary spontaneous pneumothorax**
  - **J93.12 Secondary spontaneous pneumothorax**
- J93.8 Other pneumothorax and air leak
  - **J93.81 Chronic pneumothorax**
  - **J93.82 Other air leak**
  - **J93.83 Other pneumothorax**
- **J93.9 Pneumothorax, unspecified**

**Use Code First: J93.12**

**J93.12 Secondary spontaneous pneumothorax**

- underlying condition, such as:
- catamenial pneumothorax due to endometriosis (N80.B-)
- cystic fibrosis (E84.-)
- eosinophilic pneumonia (J82.81-J82.82)
- lymphangioleiomyomatosis (J84.81)
- malignant neoplasm of bronchus and lung (C34.-)
- Marfan syndrome (Q87.4-)
- pneumonia due to Pneumocystis carinii (B59)
- secondary malignant neoplasm of lung (C78.0-)
- spontaneous rupture of the esophagus (K22.3)

**Table 1** Characteristics of hospitalisations for non-traumatic pneumothorax between 2008 and 2011 in France

| Characteristics | N=59 637 |
|---|---|
| Age (years), mean (SD) | 38 (19) |
| Year, n (%) | |
| 2008 | 14 747 (25%) |
| 2009 | 15 170 (25%) |
| 2010 | 14 898 (25%) |
| 2011 | 14 822 (25%) |
| Season, n (%) | |
| Winter | 14 927 (25%) |
| Spring | 15 101 (25%) |
| Summer | 14 442 (24%) |
| Fall | 15 167 (26%) |
| Pneumothorax type | |
| Idiopathic | 50 596 (85%) |
| Secondary | 9041 (15%) |
| Place of hospitalisation | |
| Surgical ward | 16 236 (27%) |
| Medical ward | 43 401 (73%) |
| Intensive or intermediate care unit | 16 057 (27%) |
| Surgical treatment | n=14 352 |
| Thoracoscopic blebs resection with partial pleural resection or pleural abrasion | 7529 (52%) |
| Intrapleural instillation of irritant substance | 3431 (23%) |
| Resection of bullae by thoracotomy | 2889 (20%) |
| Others | 503 (5%) |
| Hospitalisation duration, mean (SD) | 7.0 (9.0) |

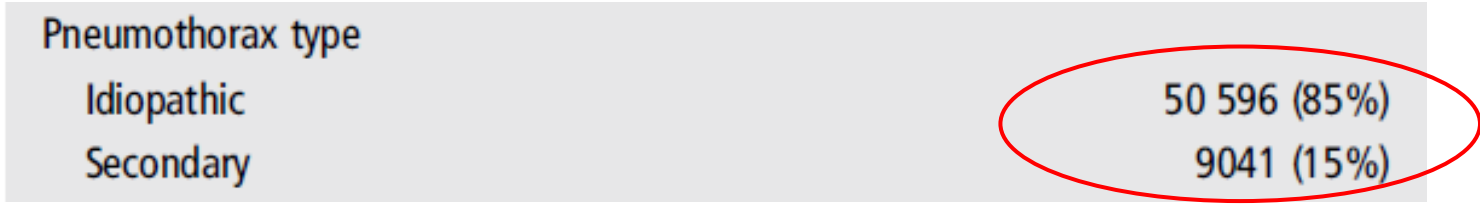


**Table 3** Comparison of hospitalisation characteristics between men and women stratified by age

| Characteristics | Men | Women | p Value |
|---|---|---|---|
| *Age 18–30 years* | *N=20 669* | *N=4487* | |
| Pneumothorax type | | | 0.95 |
| Idiopathic | 19 359 (94%) | 4204 (94%) | |
| Secondary | 1310 (6%) | 283 (6%) | |
| Place of hospitalisation | | | 0.33 |
| Surgical ward | 6303 (30%) | 1396 (31%) | |
| Medical ward | 14 366 (70%) | 3091 (69%) | |
| Intensive or intermediate care unit | 4773 (23%) | 1045 (23%) | 0.79 |
| Surgical treatment | 5700 (28%) | 1235 (28%) | 0.93 |
| Hospitalisation duration, days, mean (SD) | 5.4 (4.5) | 5.5 (5.3) | 0.06 |
| Rehospitalisation, n (%) | 10 841 (52%) | 2510 (56%) | 0.001 |
| *Age 50–65 years* | *N=5821* | *N=1953* | |
| Pneumothorax type | | | <0.0001 |
| Idiopathic | 3778 (65%) | 1508 (77%) | |
| Secondary | 2043 (35%) | 445 (23%) | |
| Place of hospitalisation | | | 0.0001 |
| Surgical ward | 1381 (24%) | 382 (20%) | |
| Medical ward | 4440 (76%) | 1571 (80%) | |
| Intensive or intermediate care unit | 1975 (34%) | 627 (32%) | 0.16 |
| Surgical treatment | 1155 (20%) | 326 (17%) | <0.0001 |
| Hospitalisation duration, days, mean (SD) | 10.1 (14.5) | 9.5 (14.8) | <0.0001 |
| Rehospitalisation, n (%) | 2616 (45%) | 747 (38%) | <0.0001 |

Original article

# Current situation of management of spontaneous pneumothorax in Japan: A cross-sectional cohort study☆

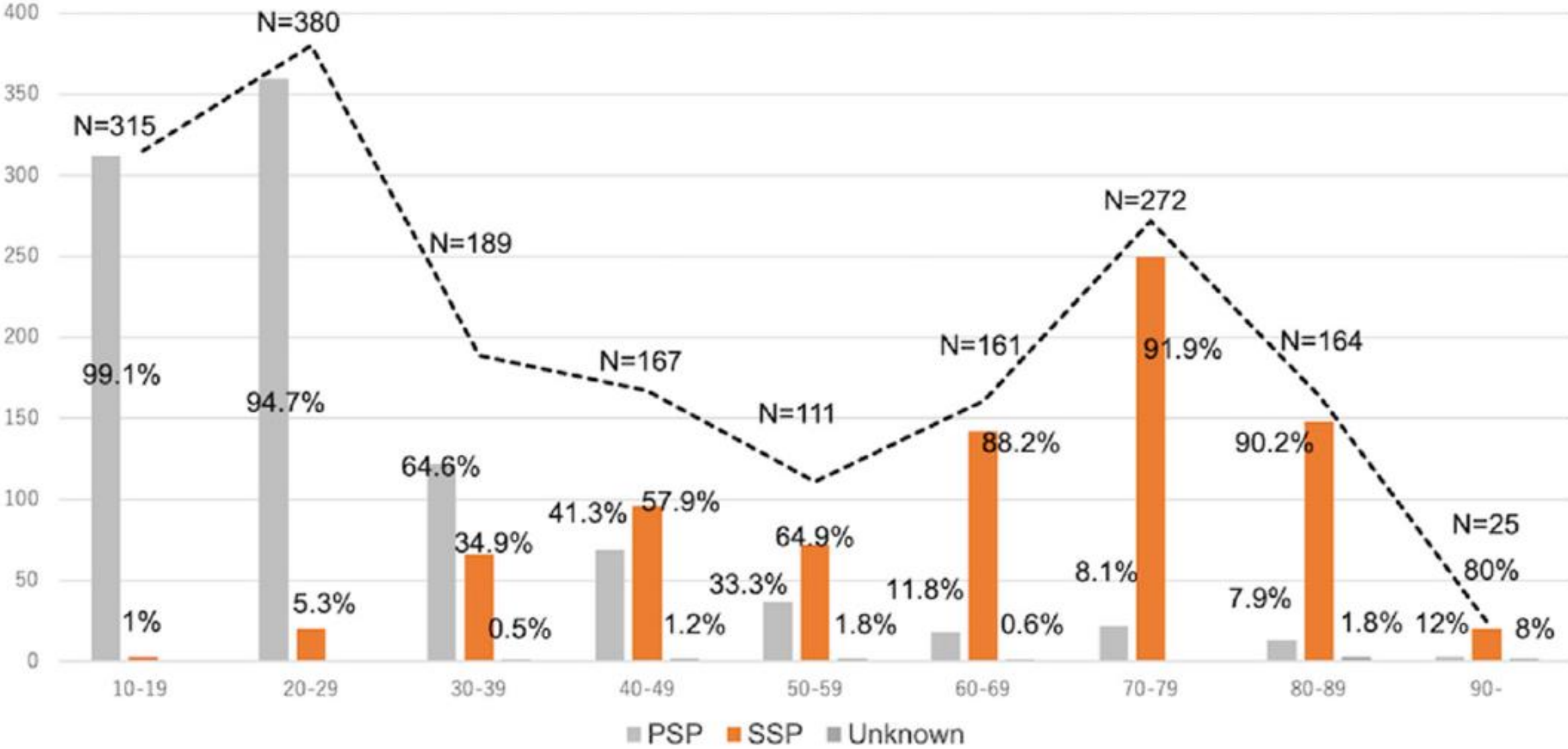
Hitoshi Igai [a,*], Noriyoshi Sawabata [b], Toshiro Obuchi [c], Noriyuki Matsutani [d], Kenji Tsuboshima [e], Shouichi Okamoto [f], Akihiro Hayashi [g]

Respiratory Investigation 62 (2024) 328–333

- The Japan Society for Pneumothorax and Cystic Lung Disease (JSPCLD)
- April 2019-March 2020, retrospective cross sectional cohort study
- 28 institution, inhospital, N=1,784

| | N=1784 | PSP (n=956, 53.6%) | SSP (n=817, 45.8%) | p-value |
|---|---|---|---|---|
| Age, median (IQR), years | 40 (22-70) | 23 (12-94) | 70 (13-96) | <0.0001 |
| Gender | | | | |
| Male | 1433 (80.3%) | 823 (86.1%) | 607 (74.3%) | <0.0001 |
| Female | 351 (19.7%) | 133 (13.9%) | 210 (25.7%) | |
| BMI, median (IQR) | 19.2 (17.4-21.2) | 19 (11.9-32.6) | 19.5 (10-33.9) | 0.0178 |
| Smoking index, median (IQR), PY | 0 (0-30) | 0 (0-150) | 30.5 (0-175) | <0.0001 |
| Mode of onset | | | | |
| First | 1031 (57.8%) | 540 (56.5%) | 483 (59.1%) | 0.522 |
| Recurrence | 748 (41.9%) | 413 (43.2%) | 332 (40.6%) | |
| Unknown | 5 (0.3%) | 3 (0.3%) | 2 (0.2%) | |
| Affected side | | | | <0.0001 |
| Right | 822 (46.1%) | 440 (46%) | 475 (58.1%) | |
| Left | 921 (51.6%) | 502 (52.5%) | 316 (38.7%) | |
| Bilateral | 41 (2.3%) | 14 (1.5%) | 26 (3.2%) | |

| Underlying disease | N=817 (%) |
|---|---|
| COPD | 438 (53.6%) |
| Interstitial pneumonia | 127 (15.5%) |
| Pulmonary fibrosis+emphysema | 68 (8.3%) |
| Malignancy | 96 (11.8%) |
| Infection | 85 (10.4%) |
| Catamenial | 79 (9.3%) |




PSP: Primary spontaneous pneumothorax, SSP: Secondary spontaneous pneumothorax

**Fig. 2.** Age distribution of the patients with spontaneous pneumothorax in Japan.

# Epidemiology and medical service use for spontaneous pneumothorax: a 12-year study using nationwide cohort data in Korea

Doori Kim,[1] Boyoung Jung ,[1] Bo-Hyoung Jang,[2] Seol-Hee Chung,[3] Yoon Jae Lee,[1] In-Hyuk Ha[1]

Kim D, *et al*. *BMJ Open* 2019;**9**:e028624.

- 2002-2013, National Sample Cohort (NSC)
- Hospital admission
- N=4,658

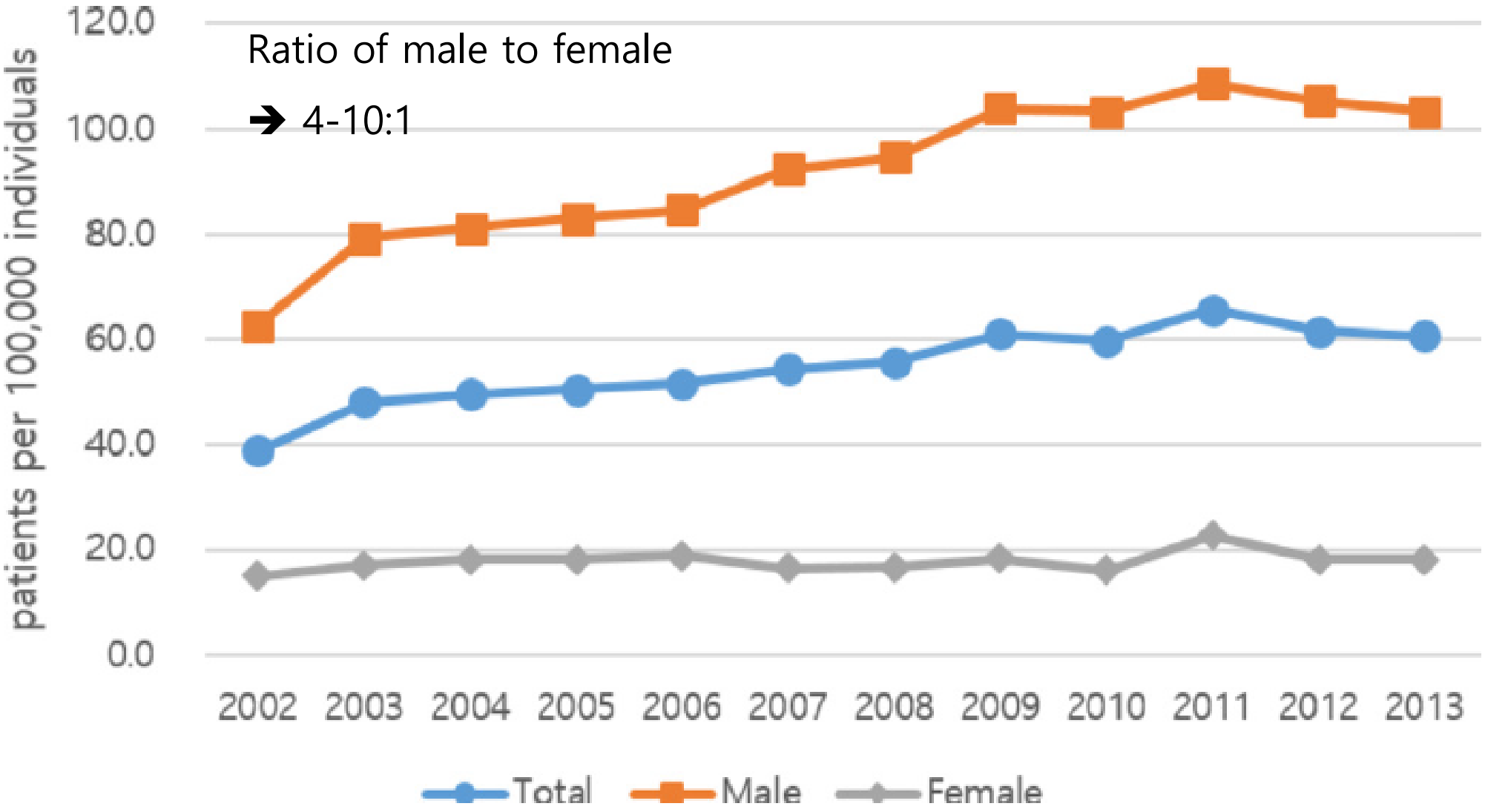



**Figure 1** Annual prevalence rate of spontaneous pneumothorax, by sex (per 100 000 individuals).

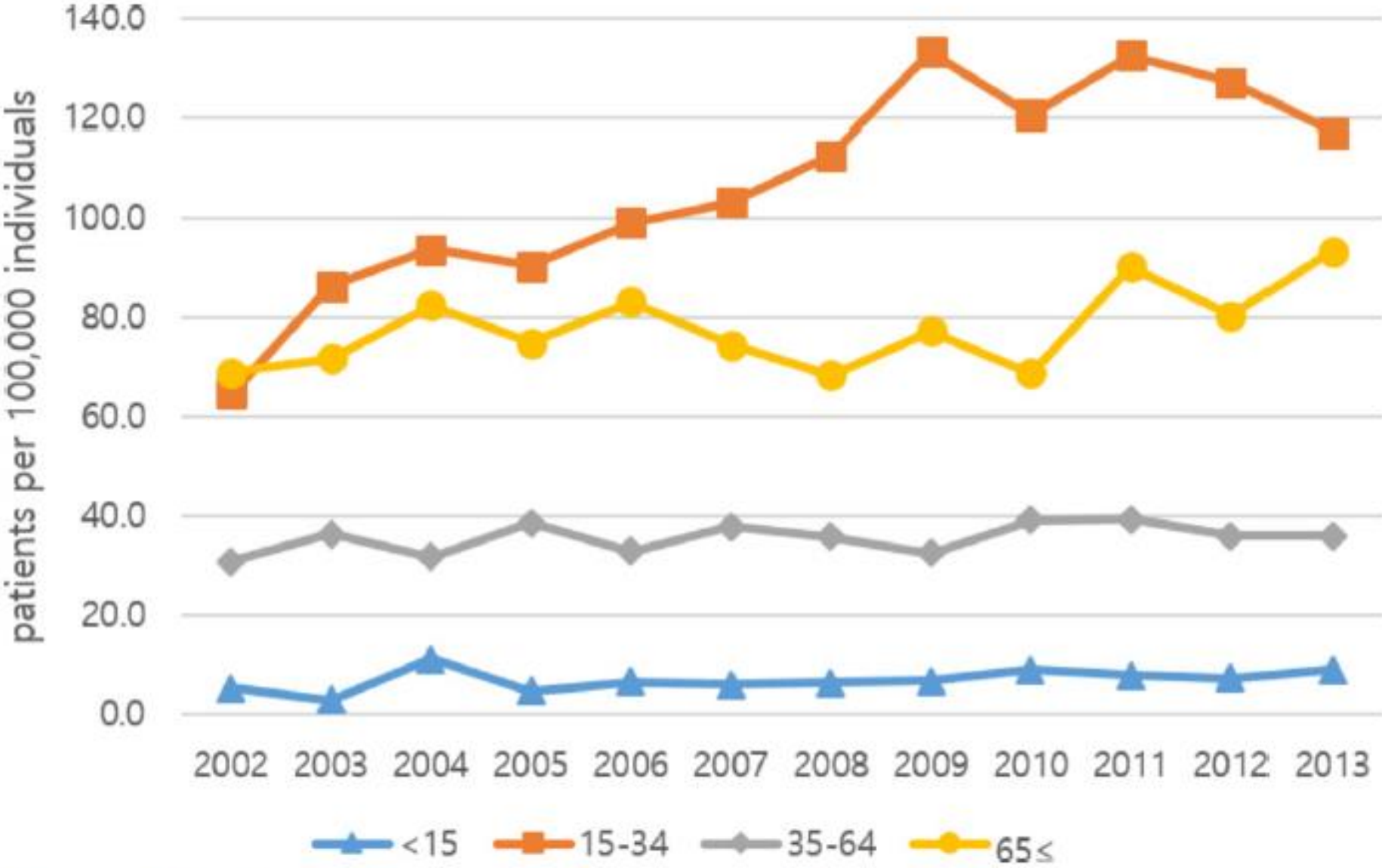



**Figure 2** Annual prevalence rate of spontaneous pneumothorax, by age (per 100 000 individuals).

**Table 3** Comorbidities of patients with SP

| | 15–34 years | | 35–64 years | | ≥65 years | | Total | |
|---|---|---|---|---|---|---|---|---|
| | n | %* | n | %† | n | %‡ | n | %§ |
| Total | 2407 | | 1374 | | 497 | | 4658 | |
| COPD | 273 | 11.3 | 277 | 20.2 | 287 | 57.7 | 837 | 18.0 |
| Pneumonia | 102 | 4.2 | 109 | 7.9 | 150 | 30.2 | 361 | 7.8 |
| Interstitial | 4 | 0.2 | 17 | 1.2 | 13 | 2.6 | 34 | 0.7 |
| Lung cancer | 11 | 0.5 | 72 | 5.2 | 67 | 13.5 | 150 | 3.2 |
| Asthma | 63 | 2.6 | 111 | 8.1 | 174 | 35.0 | 348 | 7.5 |
| Lung abscess | 1 | 0.0 | 8 | 0.6 | 0 | 0.0 | 9 | 0.2 |

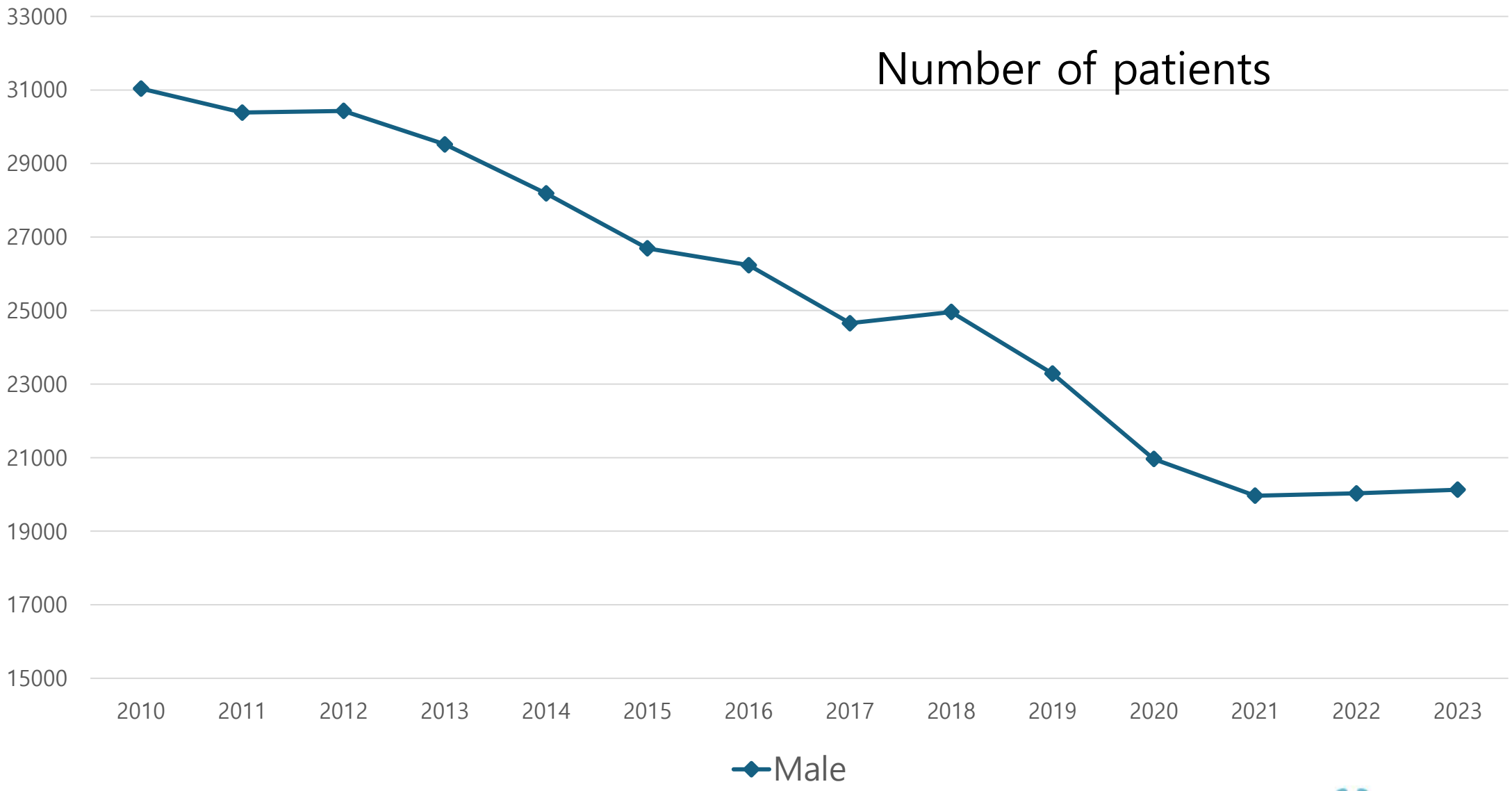
# Recent Trend of Pneumothorax in Korea

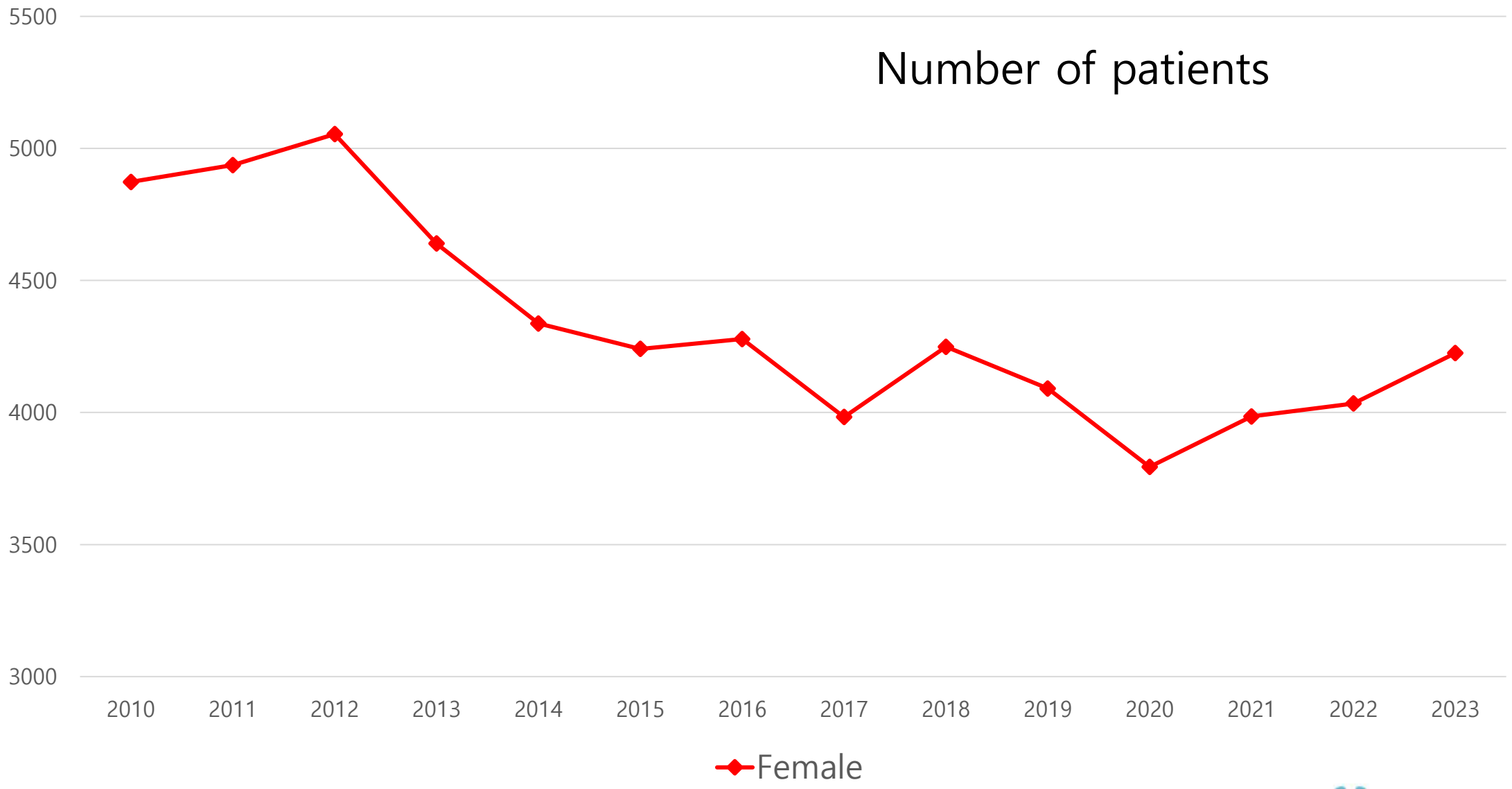
* 질병코드를 모르시는 분은 한국표준질병·사인분류를 참조하시기 바랍니다.

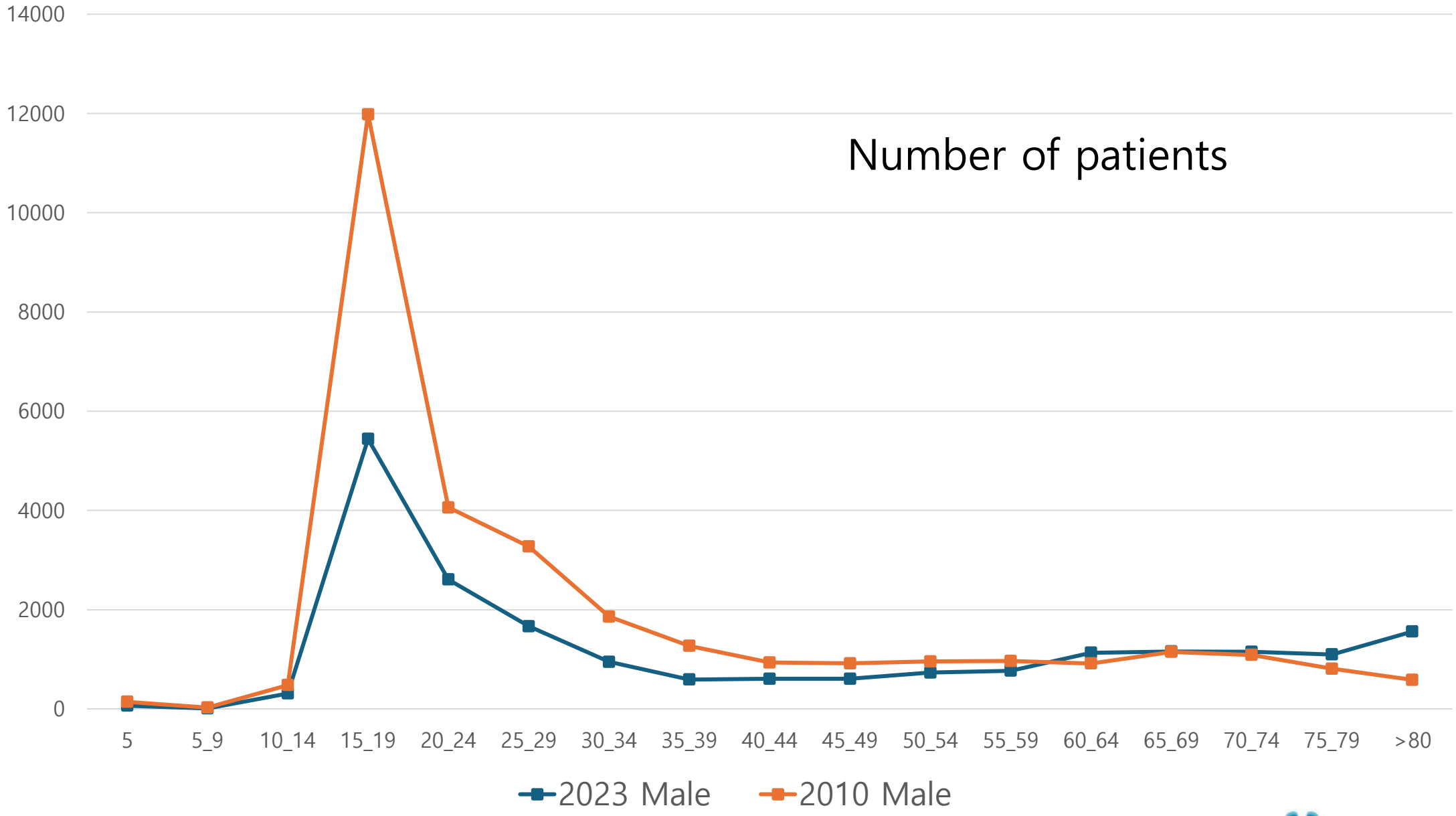
기흉 검색

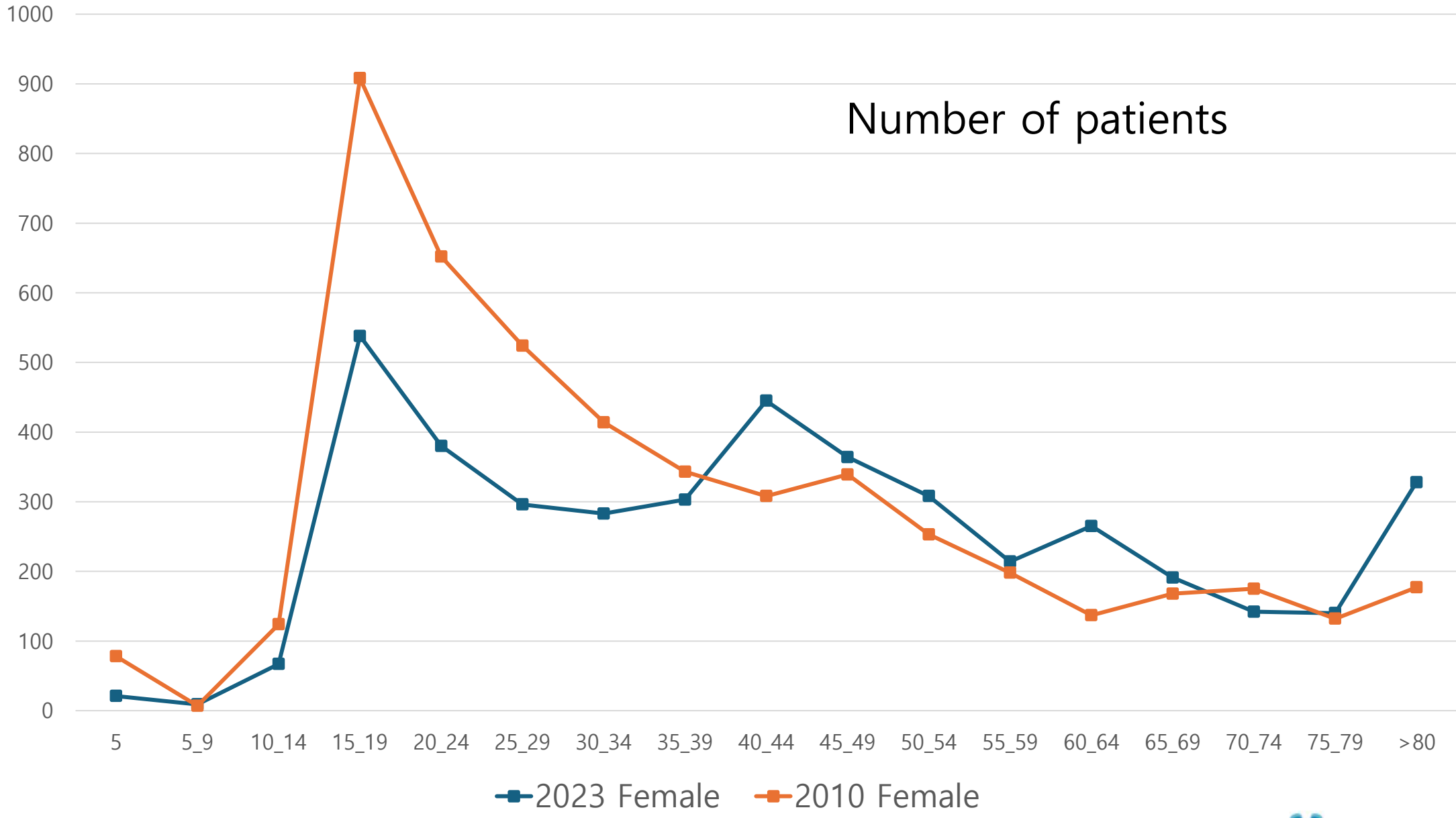
| 질병코드 | 질병명칭 |
|---|---|
| J93 | 기흉 |
| J930 | 자발성 긴장기흉 |
| J931 | 기타 자발성 기흉 |
| J938 | 기타 기흉 |
| J939 | 상세불명의 기흉 |

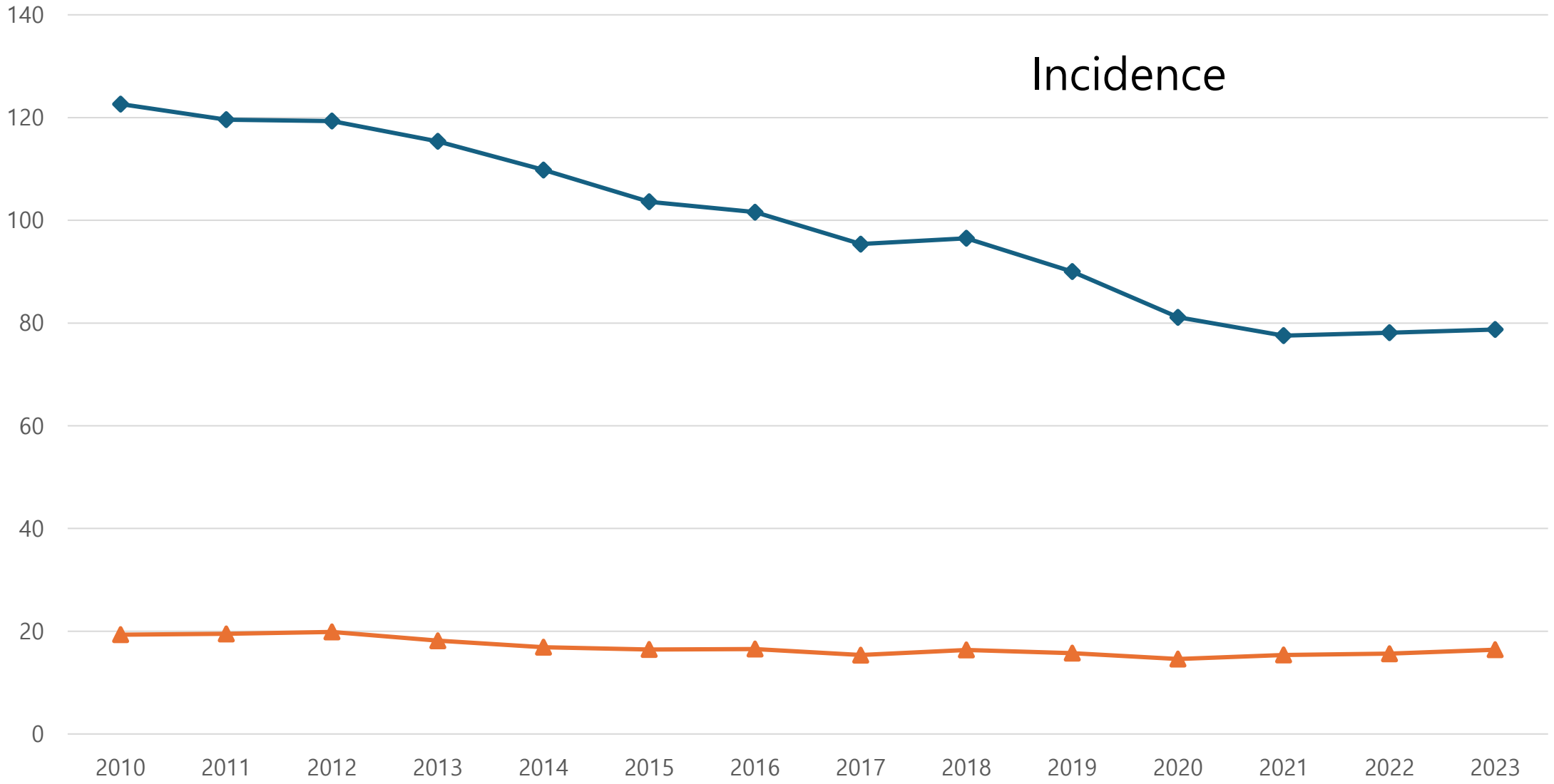
기간구분 ◉ 심사년도 ○ 진료년월 2010 ~ 2023 검색



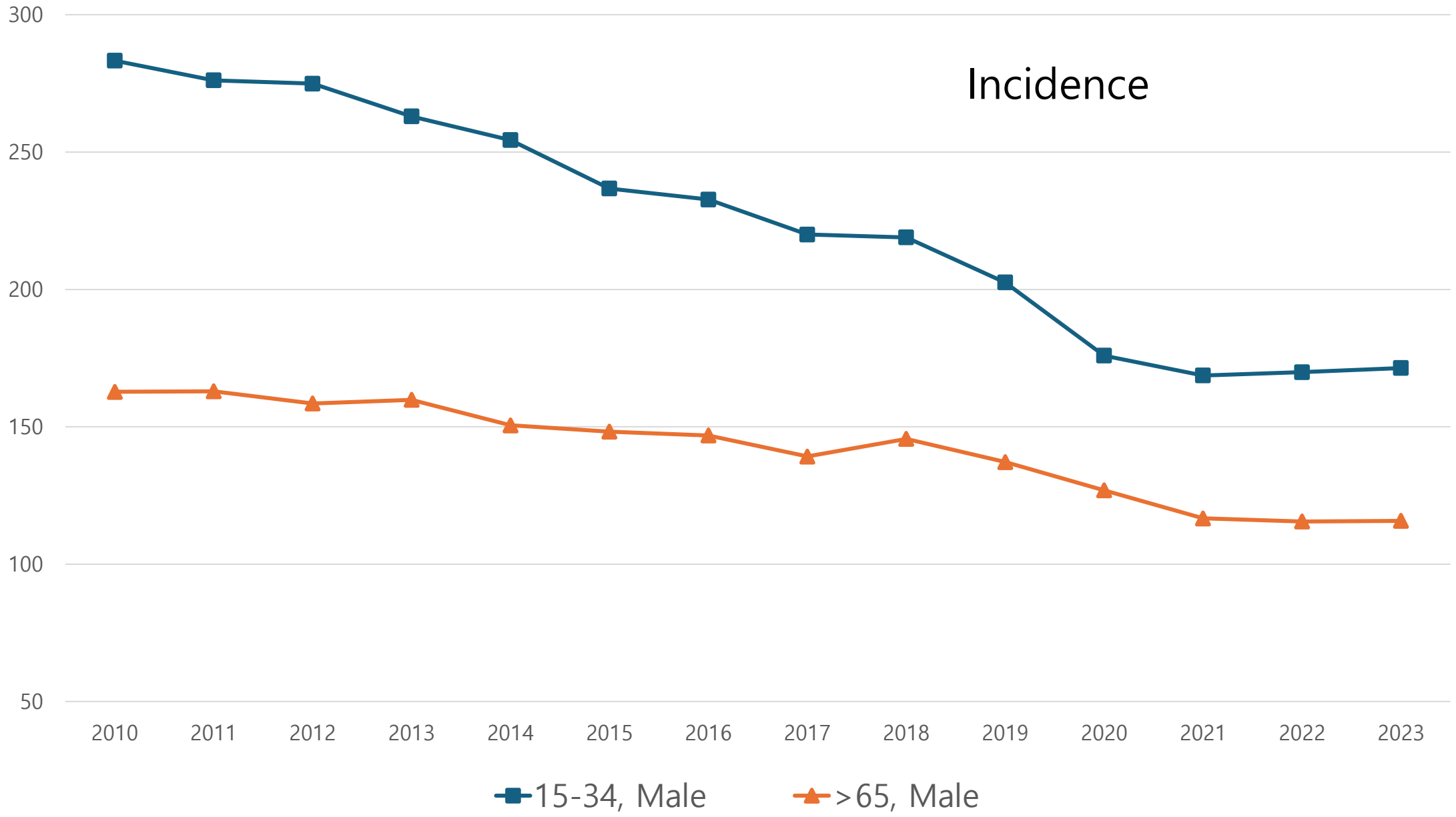


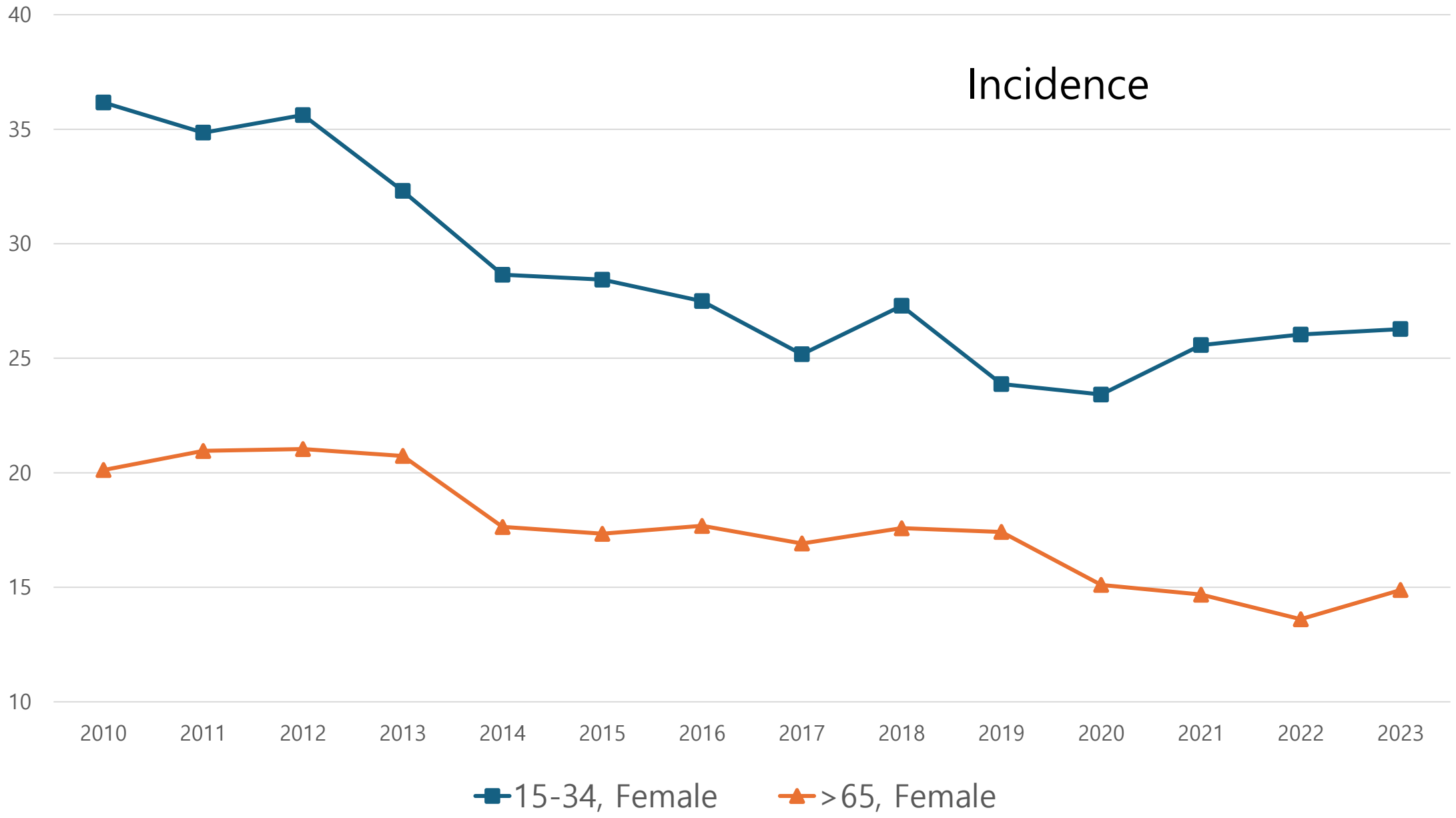







Incidence





# Take Home Message

- Even though epidemiologic studies of pneumothorax using ICD codes have some inherent limitations, the trend might be identified in the large scale data.

- The medical burden for SSP will be gradually increase d/t changes in Korea population dynamics.

- The muti-center, large scale study for the epidemiology of pneumothorax should be planned to seek true real world and understand its original nature in Korea.

# Thank You for Listening!