Bronchiectasis with Hemoptysis:
Decoding Treatable Traits for Better outcomes

경상국립대학교병원
호흡기-알레르기내과
유정완

GNUH
경상국립대학교병원
Gyeongsang National University Hospital

Contents

- ❖ Epidemiology
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Epidemiology

Hemoptysis

- **Expectoration of blood originating from the lower respiratory tract**
- **Diverse severity**

  Intermittent blood-streaked sputum to massive, life threatening airway hemorrhage

- **Life threatening hemoptysis (also called massive hemoptysis)**

  Blood amount ranging from 100 mL to more than 600 mL of blood over a 24-hour period

  Causing airway obstruction, significantly abnormal gas exchange, or hemodynamic instability

  In clinical practice approximately 150 mL of blood expectorated in a 24-hour period or bleeding at a rate ≥100 mL/hour

Eur Respir J. 2008;32(4):1131.
Harrison's principles of Internal Medicine, 20th Edition

Hemoptysis: Etiology, Evaluation, and Outcome in a Tertiary Referral Hospital*

Boaz Hirshberg, MD; Iftah Biran, MD; Mendel Glazer, MD; and Mordechai R. Kramer, MD, FCCP

Table 1—*Cause of Hemoptysis*

Diagnosis	Trivial, No. (%)	Moderate, No. (%)	Severe, No. (%)	Total	Percent
Bronchiectasis	9 (22)	26 (63)	6 (15)	41	20
Lung cancer	15 (38)	20 (51)	4 (10)	39	19
Bronchitis	18 (49)	17 (46)	2 (5)	37	18
Infection, pneumonia	15 (45)	11 (33)	7 (21)	33	16
Unknown	8 (47)	9 (53)	0	17	8
Hemorrhagic diathesis	2 (25)	2 (25)	4 (50)	8	4
Congestive heart failure	6 (75)	2 (25)	0	8	4
Other*	7 (28)	12 (48)	6 (24)	25	11
All diseases	80 (38)	99 (48)	29 (14)	208	100

*Pulmonary emboli, five (2%); bronchial adenoma, four (2%); mitral stenosis, 1%; tuberculosis, 1.4%; systemic hypertension, 1%; pulmonary hypertension, 1%; trauma, 1%; vasculitis, 1%; lipoid pneumonia, 1%; radiation pneumonitis, 1%.

CHEST 1997; 112:440-44

TABLE 1 Haemoptysis aetiologies related to symptom severity and diagnostic tests prescribed for the assessment of aetiology and their diagnostic yield

Disease	Total	Mild	Moderate	Severe
Pulmonary malignancy	116 (19.1; 95% CI 16.2–22.5)	67/116 (57.8; 95% CI 48.7–66.4)	44/116 (37.9; 95% CI 29.6–47.0)	5/116 (4.3; 95% CI 1.9–9.7)
Lung cancer	106	63/106 (59.4; 95% CI 49.9–68.3)	39/106 (36.8; 95% CI 28.2–46.3)	4/106 (3.8; 95% CI 1.5–9.3)
Pulmonary metastasis	10	4/10 (40.0; 95% CI 16.8–68.7)	5/10 (50.0; 95% CI 23.7–76.3)	1/10 (10.0; 95% CI 1.8–40.4)
Pneumonia/lung abscess	113 (18.6; 95% CI 15.7–21.9)	94/113 (83.2; 95% CI 75.2–89.0)	19/113 (16.8; 95% CI 11.0–24.8)	0/113 (0.0; 95% CI 0.0–3.3)
Bronchiectasis	90 (14.9; 95% CI 12.2–17.9)	58/90 (64.4; 95% CI 54.2–73.6)	30/90 (33.3; 95% CI 24.5–43.6)	2/90 (2.2; 95% CI 0.6–7.7)
Acute bronchitis	83 (13.7; 95% CI 11.2–16.7)	69/83 (83.1; 95% CI 73.7–89.7)	14/83 (16.9; 95% CI 10.3–26.3)	0/83 (0.0; 95% CI 0.0–4.4)
Idiopathic haemoptysis	55 (9.1; 95% CI 7.0–11.6)	40/55 (72.7; 95% CI 59.8–82.7)	15/55 (27.3; 95% CI 17.3–40.2)	0/55 (0.0; 95% CI 0.0–6.5)
COPD (stable and exacerbated)	43 (7.1; 95% CI 5.3–9.4)	35/43 (81.4; 95% CI 67.4–90.3)	8/43 (18.6; 95% CI 9.7–32.6)	0/43 (0.0; 95% CI 0.0–8.2)
Active tuberculosis	20 (3.3; 95% CI 2.1–5.0)	12/20 (60.0; 95% CI 38.7–78.1)	6/20 (30.0; 95% CI 14.5–51.9)	2/20 (10.0; 95% CI 2.8–30.1)
Other pulmonary/bronchial vascular lesion	16 (2.6; 95% CI 1.6–4.2)	8/16 (50.0; 95% CI 28.0–72.0)	5/16 (31.3; 95% CI 14.2–55.6)	3/16 (18.8; 95% CI 6.6–43.0)
Interstitial lung disease	16 (2.6; 95% CI 1.6–4.2)	11/16 (68.8; 95% CI 44.4–85.8)	5/16 (31.3; 95% CI14.2–55.6)	0/16 (0.0; 95% CI 0.0–19.4)
Upper airways bleeding disease	11 (1.8; 95% CI 1.0–3.2)	6/11 (54.6; 95% CI 28.0–78.7)	5/11 (45.5; 95% CI 21.3–72.0)	0/11 (0.0; 95% CI 0.0–25.9)
Post-tuberculosis sequelae	10 (1.7; 95% CI 0.9–3.0)	3/10 (30.0; 95% CI 10.8–60.3)	6/10 (60.0; 95% CI 31.3–83.2)	1/10 (10.0; 95% CI 1.8–40.4)

Eur Respir J 2018; 51: 1701813

Aetiology, diagnosis and treatment of moderate-to-severe haemoptysis in a North American academic centre

Nicholas Quigley, Sébastien Gagnon and Marc Fortin

	Moderate	Severe	Total
Patients	92 (55.8%)	73 (44.2%)	165 (100%)
Aetiologies			
Lung cancer	20 (21.7%)	30 (41.7%)	50 (30.3%)
Bronchiectasis	24 (26.1%)	11 (15.1%)	35 (21.2%)
Idiopathic	21 (22.8%)	12 (16.4%)	33 (20.0%)
Cystic fibrosis-related bronchiectasis	5 (5.4%)	6 (8.2%)	11 (6.7%)
Lower respiratory tract infection	5 (5.4%)	2 (2.8%)	7 (4.2%)
Iatrogenic	5 (5.4%)	1 (1.4%)	6 (3.6%)
Pulmonary embolism	4 (4.4%)	2 (2.8%)	6 (3.6%)
Others			
Arteriovenous malformation	2 (2.2%)	3 (4.1%)	5 (3.0%)
Pulmonary oedema	2 (2.2%)	1 (1.4%)	3 (1.8%)
Aspergilloma	1 (1.1%)	1 (1.4%)	2 (1.2%)
Tuberculosis	1 (1.1%)	1 (1.4%)	2 (1.2%)
Vasculitis	1 (1.1%)	0	1 (0.6%)
Arterio-bronchial fistula	0	1 (1.4%)	1 (0.6%)
Granulomatous disease	0	1 (1.4%)	1 (0.6%)
Lymphoma	0	1 (1.4%)	1 (0.6%)
Pulmonary hypertension	1 (1.1%)	0	1 (0.6%)
Median volume in 24 h mL	98	316	187
Duration of active haemoptysis			
<8 h	12 (13.0%)	18 (24.7%)	30 (18.2%)
8–24 h	20 (21.7%)	25 (34.2%)	45 (27.3%)
24–48 h	18 (19.6%)	9 (12.3%)	27 (16.4%)
>48 h	42 (45.7%)	21 (28.9%)	63 (38.2%)

ERJ Open Res 2020; 6:

Analysis of Patients with Hemoptysis in a Tertiary Referral Hospital

Bo Ram Lee, M.D., Jin Yeong Yu, M.D., Hee Jung Ban, M.D., In Jae Oh, M.D., Kyu Sik Kim, M.D., Yong Soo Kwon, M.D., Yu Il Kim, M.D., Young Chul Kim, M.D., Sung Chul Lim, M.D.

Department of Internal Medicine, Chonnam National University Hospital, Chonnam National University Medical School, Gwangju, Korea

		Mild	Moderate	Severe
Cause	Bronchiectasis	22 (31.4)	11 (30.6)	39 (33.9)
	Active pul TB	11 (15.7)	6 (16.7)	24 (20.9)
	Lung cancer	5 (7.1)	1 (2.8)	7 (6.1)
	Fungus ball	3 (4.3)	5 (13.9)	16 (13.9)
	Idiopathic	10 (14.3)	5 (13.9)	11 (9.6)
	Miscellaneous	19 (27.1)	8 (22.2)	18 (15.7)
Treatment	Conservative tx	62 (88.6)	30 (83.3)	69 (60.0)
	BAE	5 (7.1)	5 (13.9)	32 (27.8)
	Surgery	3 (4.3)	1 (2.8)	14 (12.2)

Tuberc Respir Dis 2012; 73: 107-114

Adult Patients With Bronchiectasis

A First Look at the US Bronchiectasis Research Registry

Timothy R. Aksamit, MD; Anne E. O'Donnell, MD; Alan Barker, MD; Kenneth N. Olivier, MD; Kevin L. Winthrop, MD; M. Leigh Anne Daniels, MD, MPH; Margaret Johnson, MD; Edward Eden, MD; David Griffith, MD; Michael Knowles, MD; Mark Metersky, MD; Matthias Salathe, MD; Byron Thomashow, MD; Gregory Tino, MD; Gerard Turino, MD; Betsy Carretta, MPH; and Charles L. Daley, MD; for the Bronchiectasis Research Registry Consortium

Symptom	Data Available (No.)	Overall (N = 1,826)	NTM (n = 1,158)	No NTM (n = 668)	*P* Value[b]
Fatigue, No. (%)	1,770				
Yes		886 (50)	591 (53)	295 (46)	< .01
Daily bouts of coughing, No. (%)	1,804				
Yes, any		1,314 (73)	825 (72)	489 (74)	.32
Daily productive cough, No. (%)	1,788				
Yes, productive cough		951 (53)	568 (50)	383 (59)	< .01
Hemoptysis, No. (%)	175				
Yes		409 (23)	283 (25)	126 (19)	< .01
Dyspnea, No. (%)	1,442				
No, not at rest or when active		663 (46)	420 (46)	243 (46)	.98
Yes, only when active		779 (54)	493 (54)	286 (54)	

CHEST 2017; 151(5):982-992

Evaluating hemoptysis hospitalizations among patients with bronchiectasis in the United States: a population-based cohort study

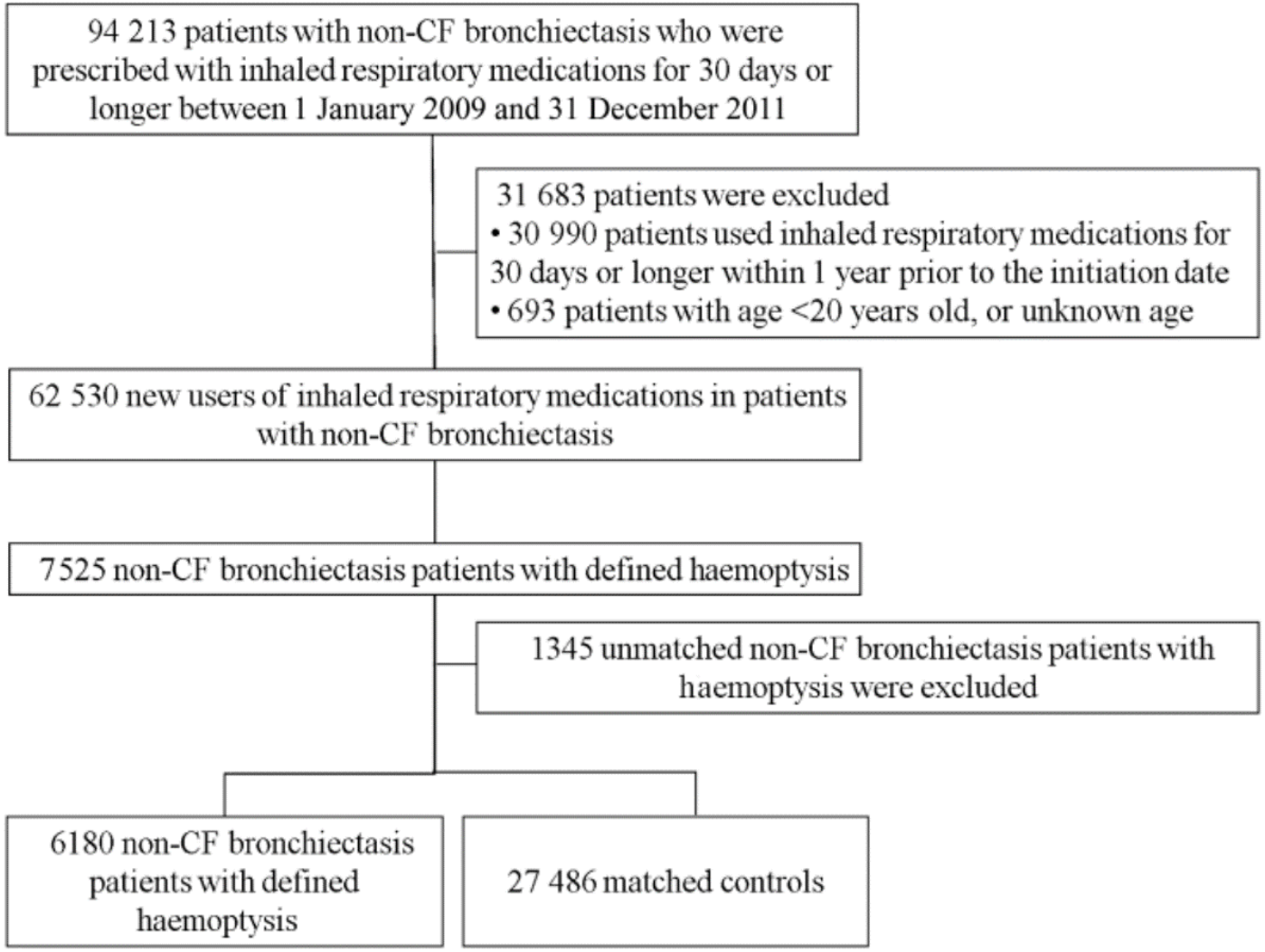
Rachel K. Lim[1,2*], Alain Tremblay[1,2], Shengjie Lu[2] and Ranjani Somayaji[2,3,4]

- ✓ **Nationwide Inpatient Sample (NIS) claims database for hospitalizations between 2016 and 2017**
- ✓ **Using the ICD-10-CM codes for hemoptysis and bronchiectasis in the United States**
- ✓ **8240 hospitalizations (weighted) for hemoptysis**
- ✓ **Mean age: 70 years, 58% female**
- ✓ **Overall in-hospital mortality: 4.5%**
- ✓ **Predictors of in-hospital mortality: undergoing three or more procedures, age, and CHF**
- ✓ **BAE: 2.1% of hospitalizations**
- ✓ **More frequently used in those with NTM and aspergillus infections**

BMC Pulmonary Medicine (2021) 21:392

Association between inhaler use and risk of haemoptysis in patients with non-cystic fibrosis bronchiectasis

EUN JIN JANG,[1,2] CHANG-HOON LEE,[1,3] HO IL YOON,[4] YUN JUNG KIM,[1] JI MIN KIM,[1] SEONG MI CHOI,[1] JAE-JOON YIM[3] AND DEOG KYEOM KIM[5]



- ✓ **Nested case–control study using a national claims database**
- ✓ **from1 January 2009 to 31 December 2011**
- ✓ **Inhalers including inhaled ICS, LABA, LAMA, SABA, SAMA and their combinations**

Respirology (2015) 20, 1213–1221

Baseline characteristics	Cases with haemoptysis (n = 6180)	Control (n = 27 486)	P-value*
Sex (male, %)	3437 (55.6)	15 250 (55.5)	Matched
Age†			
Mean ± SD	64.3 ± 11.5	64.5 ± 11.5	Matched
Median (Q1, Q3)	66.0 (57, 73)	66.0 (57, 73)	
Charlson comorbidity index‡			
Mean ± SD	4 ± 2.4	3 ± 2.1	<0.0001
Median (Q1, Q3)	3 (2, 5)	2 (1, 4)	
Respiratory disease‡			Matched
COPD with/without asthma	3783 (61.2)	16 836 (61.3)	
Asthma only	1246 (20.2)	5695 (20.7)	
Other respiratory disease	1151 (18.6)	4955 (18.0)	
Comorbidities‡			
Diabetes	2046 (33.1)	7648 (27.8)	<0.0001
Malignancy except lung cancer	876 (14.2)	1985 (7.2)	<0.0001
Chronic renal disease	346 (5.6)	890 (3.2)	<0.0001
Heart disease	1585 (25.6)	6005 (21.8)	<0.0001
Liver disease	2118 (34.3)	7448 (27.1)	<0.0001
Health-care utilization§			
Number of hospitalization			
Mean ± SD	1.2 ± 2.2	0.9 ± 1.8	<0.0001
Median (Q1, Q3)	0 (0, 2)	0 (0, 1)	
Number of outpatient visit			
Mean ± SD	42.6 ± 36.7	38.7 ± 36.1	<0.0001
Median (Q1, Q3)	33 (19, 54)	29 (16, 49)	
Number of ER visit			
Mean ± SD	1 ± 1.6	0 ± 1.4	<0.0001
Median (Q1, Q3)	0 (0, 1)	0 (0, 1)	
Concomitant medications			
Anticoagulants¶	199 (3.2)	477 (1.7)	<.0001
Number of antiplatelet agents¶			
Mean ± SD	1 ± 0.4	1 ± 0.4	0.001
Median (Q1, Q3)	1 (1, 1)	1 (1, 1)	
Fibrinolytic agents††	2 (0.0)	3 (0.3)	0.23
Systemic corticosteroids prescription days‡‡			
Mean ± SD	22 ± 30.2	19 ± 27.8	0.002
Median (Q1, Q3)	8 (3, 25)	8 (3, 21)	
Other immunosuppressives including TNF-α	90 (1.5)	322 (1.2)	0.07

Respirology (2015) 20, 1213–1221

Table 2 Risk of haemoptysis according to types of inhaler

	Cases with haemoptysis (n = 6180)	Control (N = 27 486)	Unadjusted		Adjusted[‡]		Adjusted[§]	
Inhalers[†]	n (%)	n (%)	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
ICS	90 (1.5)	418 (1.5)	1.0 (0.8–1.2)	0.86	1.0 (0.8–1.3)	0.96	1.0 (0.8–1.2)	0.75
ICS/LABA	966 (15.6)	4014 (14.6)	1.1 (1.0–1.2)	0.02	1.1 (1.0–1.2)	0.11	1.1 (1.0–1.1)	0.24
SABA	445 (7.2)	1550 (5.6)	1.3 (1.2–1.5)	<0.001	1.3 (1.2–1.5)	<0.001	1.2 (1.1–1.4)	<0.001
LAMA	733 (11.9)	2697 (9.8)	1.2 (1.1–1.4)	<0.001	1.2 (1.1–1.4)	<0.001	1.2 (1.1–1.4)	<0.001
SABA/SAMA	14 (0.2)	58 (0.2)	1.0 (0.5–1.8)	0.99	1.0 (0.6–1.9)	0.89	1.0 (0.6–1.9)	0.94
SAMA	36 (0.6)	84 (0.3)	1.8 (1.2–2.7)	0.004	1.8 (1.2–2.7)	0.005	1.6 (1.1–2.4)	0.03
LABA	74 (1.2)	338 (1.2)	1.0 (0.8–1.3)	0.85	1.0 (0.8–1.3)	0.99	1.0 (0.8–1.3)	0.98

Conditional logistic regression.[†]30 days or longer within 90 days prior to index date.[‡]Adjusted for other inhaler medications.[§]Adjusted for other inhaler medications and age, CCI, diabetes, malignancy except lung cancer, chronic renal disease, heart disease, liver disease, number of hospitalization, number of outpatient visit, number of ER visit, anticoagulant, number of anti-platelet, fibrinolytic agent, other immunosuppressives including TNF-α and systemic corticosteroids prescription days.ICS, inhaled corticosteroid; LABA, long-acting inhaled β_2 agonists; LAMA, long-acting inhaled muscarinic antagonist; SABA, short-acting inhaled β_2 agonists; SAMA, short-acting inhaled muscarinic antagonist.

Respirology (2015) 20, 1213–1221

Table 3 Risk of haemoptysis in anticholinergics users according to cumulative dose and drug adherence

Inhalers	Cases with haemoptysis (n = 6180) n (%)	Control (n = 27 486) n (%)	Unadjusted OR (95% CI)	Unadjusted P-value	Adjusted[††] OR (95% CI)	Adjusted[††] P-value	Adjusted[‡‡] OR (95% CI)	Adjusted[‡‡] P-value
Anti-cholinergics[†]								
Prescription days[‡]								
0	5153 (83.4)	23 797 (86.6)	1		1		1	
1–30	421 (6.8)	1470 (5.3)	1.3 (1.2–1.5)	<0.001	1.3 (1.2–1.5)	<0.001	1.3 (1.2–1.5)	<0.001
>30	606 (9.8)	2219 (8.1)	1.3 (1.2–1.4)	<0.001	1.3 (1.1–1.4)	<0.001	1.3 (1.2–1.4)	<0.001
MPR[§,¶]				<0.001		<0.001		<0.001
0	5156 (83.4)	23 813 (86.6)	1		1		1	
0 < MPR ≤ 0.25	176 (2.8)	661 (2.4)	1.2 (1.0–1.5)	0.02	1.2 (1.0–1.5)	0.02	1.2 (1.0–1.5)	0.03
0.25 < MPR ≤ 0.5	383 (6.2)	1 328 (4.8)	1.3 (1.2–1.5)	<0.001	1.3 (1.2–1.5)	<0.001	1.3 (1.2–1.5)	<0.001
0.5 < MPR ≤ 0.75	233 (3.8)	780 (2.8)	1.4 (1.2–1.7)	<0.001	1.4 (1.2–1.6)	<0.001	1.4 (1.2–1.7)	<0.001
0.75 < MPR ≤ 1	232 (3.8)	904 (3.3)	1.2 (1.0–1.4)	0.02	1.2 (1.0–1.4)	0.03	1.2 (1.0–1.4)	0.01
LAMA[‡]								
Prescription days[‡]								
0	5223 (84.5)	24 013 (87.4)	1		1		1	
1–30	374 (6.1)	1316 (4.8)	1.3 (1.2–1.5)	<0.001	1.3 (1.2–1.5)	<0.001	1.3 (1.1–1.5)	<0.001
>30	583 (9.4)	2157 (7.8)	1.3 (1.1–1.4)	<0.001	1.2 (1.1–1.4)	<0.001	1.3 (1.1–1.4)	<0.001
MPR[§,¶]				<0.001		<0.001		<0.001
0	5226 (84.6)	24 028 (87.4)	1		1		1	
0 < MPR ≤ 0.25	159 (2.6)	589 (2.1)	1.2 (1.0–1.5)	0.03	1.2 (1.0–1.5)	0.026	1.3 (1.0–1.5)	0.02
0.25 < MPR ≤ 0.5	347 (5.6)	1218 (4.4)	1.3 (1.1–1.5)	<0.001	1.3 (1.2–1.5)	<0.001	1.3 (1.1–1.5)	<0.001
0.5 < MPR ≤ 0.75	220 (3.6)	758 (2.8)	1.4 (1.2–1.6)	<0.001	1.4 (1.2–1.6)	<0.001	1.4 (1.2–1.6)	<0.001
0.75 < MPR ≤ 1	228 (3.7)	893 (3.2)	1.2 (1.0–1.4)	0.03	1.2 (1.0–1.4)	0.04	1.2 (1.0–1.4)	0.02

Possible Mechanisms

- One theory suggests that inhaled bronchodilators, like SABAs and LAMAs, cause vasodilation (widening of blood vessels), potentially increasing blood flow to the already fragile bronchial vessels.

- Another theory is that these inhalers may irritate the airways, causing inflammation and making them more prone to bleeding

RESEARCH

A retrospective analysis of risk factors for massive hemoptysis in patients with bronchiectasis

Ling Luo†, Jing Luo† and Yu Jiang*

- ✓ Retrospective study reviewing medical records of patients with bronchiectasis
- ✓ Between January 2014 and June 2021
- ✓ 61 (16 %) of 379 patients: severe hemoptysis
- ✓ Predictors of severe hemoptysis

  DM, Lesions involving two lobes and three lobes

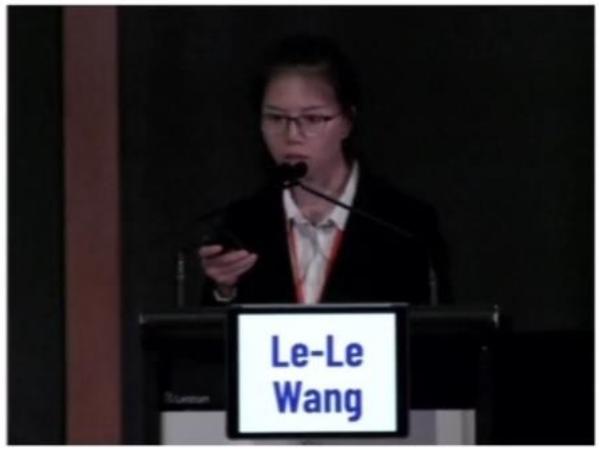
Variable	OR	95% CI	*P* value
Gender			
Male	Ref		
Female	0.565	0.307–1.043	0.068
Course (years)			
≤ 1	Ref		
(1,5]	0.3000	0.112–0.801	0.016
(5,10]	0.850	0.382–1.890	0.690
> 10	0.784	0.357–1.724	0.545
Diabetes			
No	Ref		
Yes	2.885	1.009–8.247	0.048
Lobes			
1	Ref		
2	4.347	1.960–9.638	< 0.001
3	2.787	1.055–7.363	0.039
4	1.017	0.201–5.137	0.984
5	2.431	0.844–6.999	0.100
Left lower lobe			
No	Ref		
Yes	0.394	0.196–0.793	0.009

BMC Pulmonary Medicine (2022) 22:214

8th WORLD BRONCHIECTASIS CONFERENCE

BRISBANE, AUSTRALIA
14-17 JULY 2025

Factors associated with hemoptysis in patients with non-cystic fibrosis bronchiectasis: cross-sectional analysis of data from the BE-China Registry



Le-Le Wang (China)

Presenter: Le-Le Wang
Institution: Tongji University, Shanghai, China
Supervisor: Professor Jin-Fu Xu
14 July 2025, Brisbane

Lung Foundation Australia

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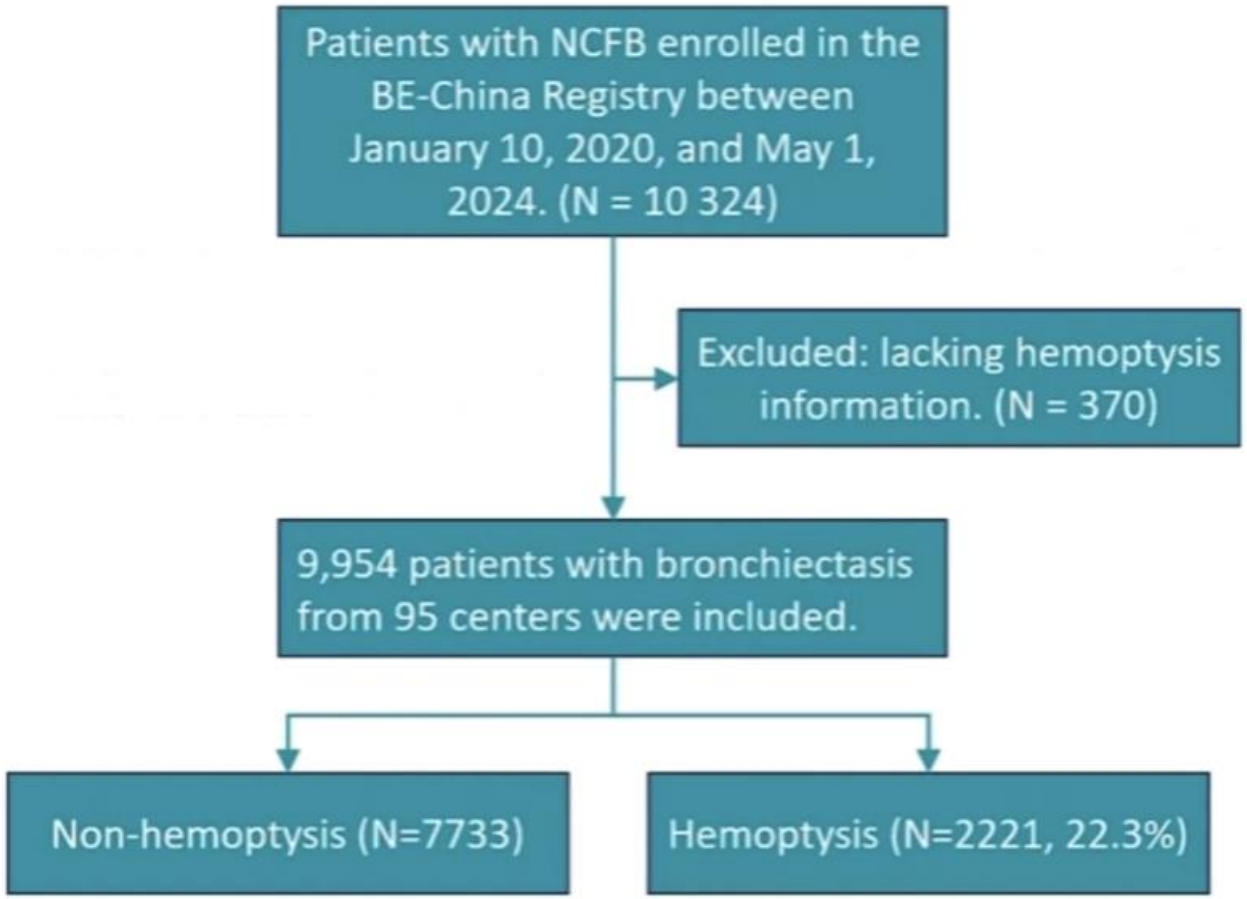
Methods



Hemoptysis was defined as the expectoration of blood from the airways or lung parenchyma at the time of admission.

Data collected includes demographic characteristics, symptoms, chest CT images, etiology, pulmonary function, microbiology, comorbidities, disease severity scores.

This study was conducted as a **cross-sectional analysis**.

All collaborating centres have received approvals from their local ethics committees.

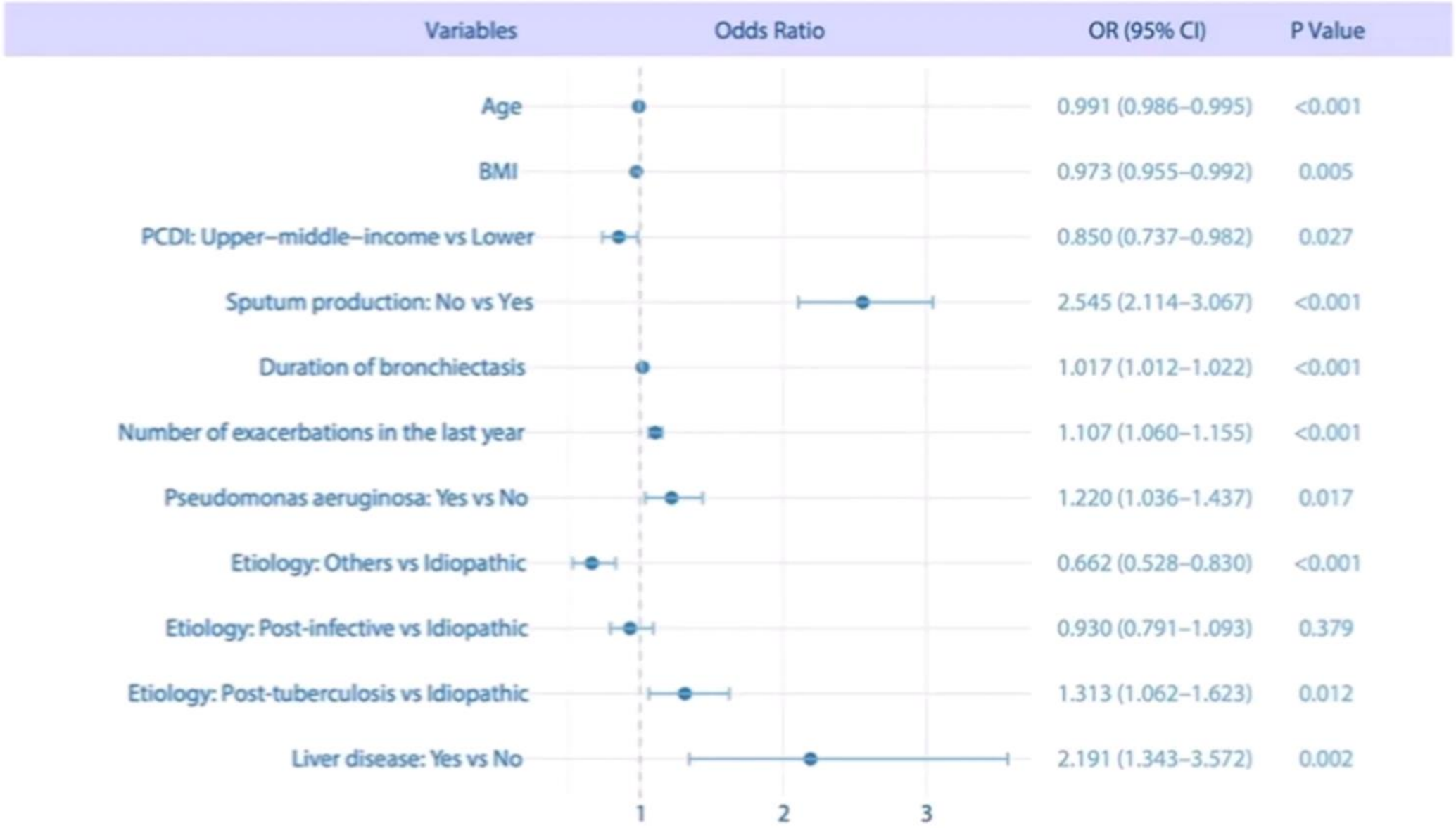
Baseline demographic and clinical characteristics

Variables	No hemoptysis		Hemoptysis		P value
	Number	Mean±SD or Median (Q1,Q3) or Proportion	Number	Mean±SD or Median (Q1,Q3) or Proportion	
Age, years	7513	63.44±14.27	2149	62.17±13.67	<0.001
Sex	7733		2221		0.342
Female	4475	57.9	1311	59.0	
Male	3258	42.1	910	41.0	
Body mass index, $kg \cdot m^{-2}$	6902	21.81±3.73	1908	21.42±3.87	<0.001
Smoking	7642		2209		0.392
Non-smoker	6368	83.3	1823	82.5	
Smoker	1274	16.7	386	17.5	
PCDI	7733		2221		0.004
Upper-middle-income	5577	72.1	1531	68.9	
Lower-middle-income	2156	27.9	690	31.1	
Duration of bronchiectasis	7682	4.08(2.50,9.80)	2214	4.91(3.07,13.32)	<0.001
Reiff score	7300	4(2,6)	2121	4(2,6)	0.465
BSI score	3721	9(5,12)	898	10(7,13)	<0.001

Baseline demographic and clinical characteristics

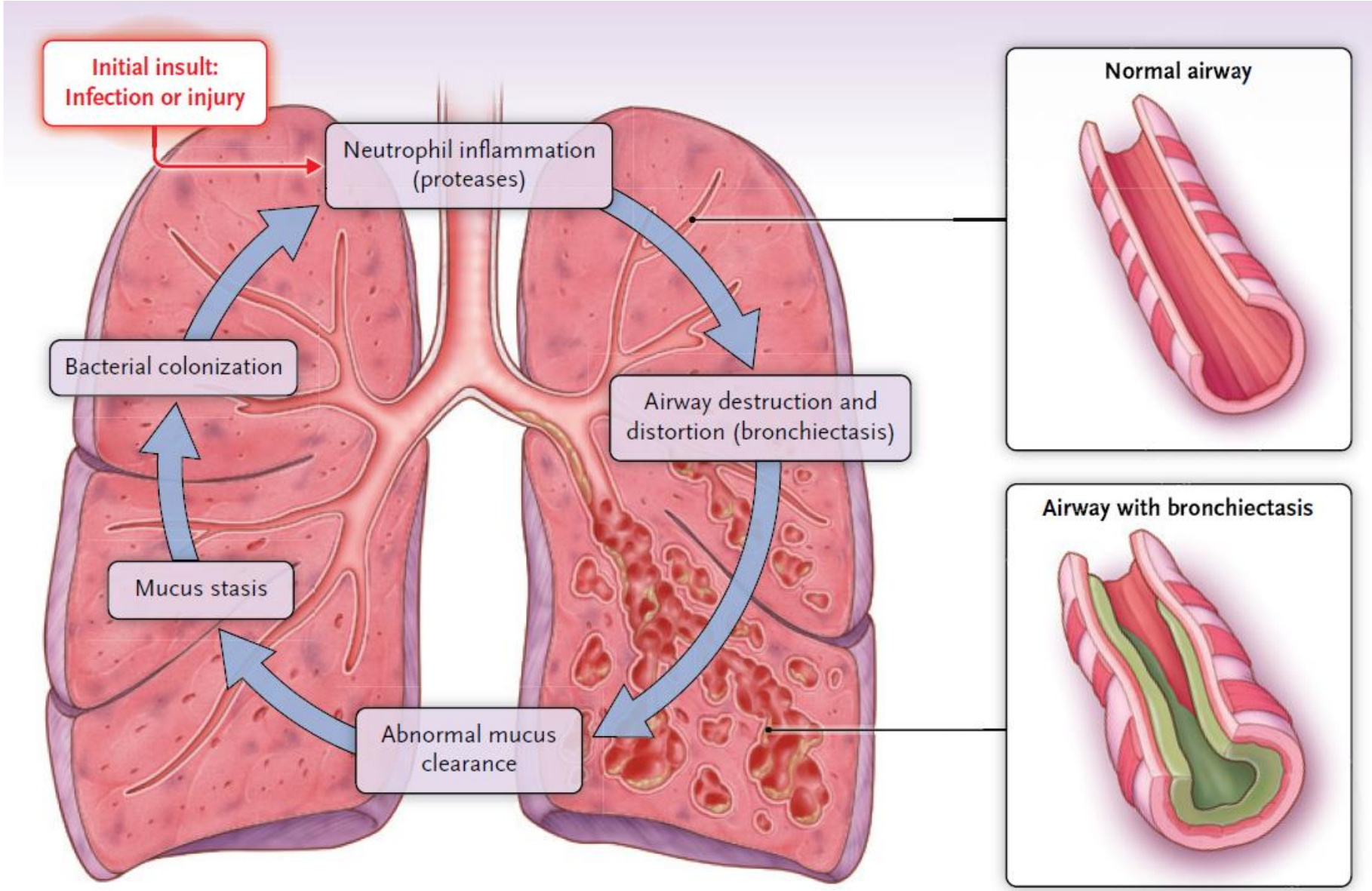
Variables	No hemoptysis		Hemoptysis		P value
	Number	Mean±SD or Median (Q1,Q3) or Proportion	Number	Mean±SD or Median (Q1,Q3) or Proportion	
Number of hospitalizations in the last 2 years	7401		2090		<0.001
0	3040	41.1	719	34.4	
1	2223	30.0	686	32.8	
2	1167	15.8	365	17.5	
3+	971	13.1	320	15.3	
Number of exacerbations in the last year	7428		2107		<0.001
0	2379	32.0	483	22.9	
1	2890	38.9	890	42.2	
2	1297	17.5	421	20.0	
3+	862	11.6	313	14.9	

Independent risk factors for hemoptysis



GNUH
경상대학교병원
Gyeongsang National University Hospital

Pathophysiology



NEJM 2022; 387: 533-45

Pathophysiology of hemoptysis

- **Deoxygenated blood in the pulmonary arteries at lower pulmonary pressures (mean pulmonary artery pressure, 12-16 mm Hg) and oxygenated blood flowing within the bronchial arteries at systemic pressures (mean arterial pressure, 100mmHg)**
- **Inflammation, hypoxia, and neoplasia can incite proliferation of bronchial vasculature via secretion of proangiogenic factors (VEGF and angiopoietin-1)**
- **New vessels are usually thin-walled and fragile, are exposed to increased systemic arterial pressures, and are prone to rupture into the airways resulting in hemoptysis**
- **90% of cases of massive hemoptysis from bronchial vasculature**
- **Additional recruitment of nonbronchial collateral vessels**

AJRCCM 2001; 164: S39-45
CHEST 2020; 157 (1): 77-88

Treatable trait

Clinical phenotypes in adult patients with bronchiectasis

Stefano Aliberti[1], Sara Lonni[1], Simone Dore[2], Melissa J. McDonnell[3], Pieter C. Goeminne[4,5], Katerina Dimakou[6], Thomas C. Fardon[7], Robert Rutherford[3], Alberto Pesci[1], Marcos I. Restrepo[8], Giovanni Sotgiu[2] and James D. Chalmers[7]

Secondary analysis of five European databases of prospectively enrolled adult outpatients with bronchiectasis

Principal component and cluster analyses were performed using demographics, comorbidities, and clinical, radiological, functional and microbiological variables

Among 1145 patients (median age 66 years; 40% male)

4 clusters:

Cluster 1 : Pseudomonas (16%)

Cluster 2 : Other chronic infection (24%)

Cluster 3 : Daily sputum (33%)

Cluster 4 : Dry bronchiectasis (27%)

Eur Respir J 2016; 47: 1113–1122

	Cluster 1: "*Pseudomonas*"	Cluster 2: "Other chronic infection"	Cluster 3: "Daily sputum"	Cluster 4: "Dry bronchiectasis"	Overall p-value
Patients	179 (100)	273 (100)	373 (100)	307 (100)	
Centre					<0.0001
Dundee, UK	44 (24)	128 (47)	90 (24)	24 (8)	
Leuven, Belgium	16 (9)	19 (7)	66 (18)	89 (29)	
Monza, Italy	23 (13)	24 (9)	87 (23)	96 (31)	
Galway, Ireland	39 (22)	78 (28)	74 (20)	89 (29)	
Athens, Greece	57 (32)	24 (9)	56 (15)	9 (3)	
Demographics and comorbidities					
Age years	67 (56–75)	65 (56–73)	67 (57–74)	66 (55–74)	0.52
Male	81 (45)	112 (41)	148 (40)	109 (36)	0.19
BMI $kg \cdot m^{-2}$	25 (21–27)	25 (22–28)	25 (22–28)	25 (21–28)	0.47
Smoker/ex-smoker	56 (31)	90 (33)	165 (44)	121 (39)	0.005
CCI >1	53 (30)	101 (37)	113 (30)	106 (35)	0.20
Disease severity					
BSI score	14 (11–17)	7 (5–10)	6 (3–9)	5 (3–7)	0.0001
FACED score	4 (2–5)	2 (1–3)	2 (1–3)	1 (0–3)	<0.001
Radiological status					
Reiff score	6 (4–9)	4 (2–6)	3 (2–6)	3 (2–6)	0.0001
Clinical status					
Daily cough	170 (95)	241 (88)	322 (86)	154 (50)	<0.0001
Daily sputum	166 (93)	204 (75)	362 (97)	0 (0)	<0.0001
Prior history of haemoptysis	42 (24)	36 (13)	80 (22)	43 (14)	0.002
MRC breathlessness scale	3 (2–5)	2 (1–3)	2 (1–3)	1 (1–2)	0.0001
Long-term oxygen therapy	34 (19)	14 (5.1)	36 (9.7)	0 (0)	<0.0001
Exacerbations in the previous year	3 (2–4)	2 (1–3)	2 (1–3)	2 (1–3)	0.0001
At least one hospitalisation in the previous year	109 (61)	63 (23)	90 (24)	36 (12)	<0.0001

Eur Respir J 2016; 47: 1113–1122

Pulmonary exacerbation in adults with bronchiectasis: a consensus definition for clinical research

Definition of a bronchiectasis pulmonary exacerbation for clinical trials

A person with bronchiectasis with a deterioration in three or more of the following key symptoms for at least 48 h:

1) Cough
2) Sputum volume and/or consistency
3) Sputum purulence
4) Breathlessness and/or exercise tolerance
5) Fatigue and/or malaise
6) Haemoptysis

AND a clinician determines that a change in bronchiectasis treatment is required#

Eur Respir J 2017; 49: 1700051

Hemoptysis as the presenting manifestation of bronchiectasis-associated hospitalization in Korea

Hyewon Seo[1], Seung-Ick Cha[1], Jongmin Park[2], Jae-Kwang Lim[2], Ji-Eun Park[1], Sun Ha Choi[1], Yong Hoon Lee[1], Seung-Soo Yoo[1], Shin-Yup Lee[1], Jaehee Lee[1], Chang-Ho Kim[1], Jae-Yong Park[1]

- ✓ **Retrospective analysis of clinical data**
- ✓ **Patients with bronchiectasis-associated hospitalization at a tertiary referral center**
- ✓ **Classification into Hemoptysis group (n=267, 54.5%) and Infective exacerbation (IE) group (n=223, 45.5%)**

J Thorac Dis 2023;15(7):3636-3645

Characteristics	Hemoptysis (n=267)	Infective exacerbation (n=223)	P value
Age, years	66 [59–73]	72 [64–79]	<0.001
Male sex	125 (46.8)	141 (63.2)	<0.001
Smoking			
Ever-smoker	97 (36.7)	106 (47.7)	0.014
Pack-years	0 [0–20]	0 [0–30]	0.010
BMI (kg/m^2)	21.4 [19.1–23.9]	20.9 [18.7–23.7]	0.522
Excessive alcohol use	20 (7.6)	17 (8.0)	0.879
ECOG	1 [1–1]	2 [1–3]	<0.001
CCI	0 [0–1]	1 [0–1]	<0.001
Antithrombotic drugs	60 (22.5)	49 (22.0)	0.895
Colonization			
Pseudomonas aeruginosa	10 (3.7)	23 (10.3)	0.004
Other pathogens	6 (2.2)	7 (3.1)	0.541
Systolic blood pressure, mmHg	150 [134–167]	130 [116–151]	<0.001
Pulse rate, /min	90 [80–102]	100 [87–111]	<0.001
Respiratory rate, /min	20 [18–21]	22 [20–28]	<0.001
Symptoms at presentation			
Duration of symptom, days	1 [1–3]	5 [3–7]	<0.001
Cough	198 (74.2)	197 (88.3)	<0.001
Sputum production	144 (53.9)	194 (87.0)	<0.001
Dyspnea	101 (37.8)	171 (76.7)	<0.001
Fever	22 (8.2)	120 (53.8)	<0.001
Altered mental status	3 (1.1)	12 (5.4)	0.006
Chest pain	7 (2.6)	38 (17.0)	<0.001

J Thorac Dis 2023;15(7):3636-3645

Characteristics	Hemoptysis (n=267)	Infective exacerbation (n=223)	P value
Mechanical ventilation	3 (1.1)	15 (6.7)	0.001
Vasopressor infusion	3 (1.1)	26 (11.7)	<0.001
Systemic corticosteroids	75 (28.1)	85 (38.1)	0.018
Etiology			
Idiopathic	90 (33.7)	84 (37.7)	0.362
Previous pulmonary TB	125 (46.8)	77 (34.5)	0.006
Previous NTM pulmonary disease	13 (4.9)	6 (2.7)	0.214
Post-infectious	33 (12.4)	35 (15.7)	0.288
Measles	20 (7.5)	23 (10.3)	0.271
Pertussis	9 (3.4)	10 (4.5)	0.525
Unclassified RTI	4 (1.5)	2 (0.9)	0.693
COPD	5 (1.9)	11 (4.9)	0.058
Others[†]	1 (0.4)	10 (4.5)	0.002
FEV_1 (%) (n=195)[‡]	80 [63–97]	70 [52–87]	0.015
FACED score (n=195)[‡]	1 [0–3]	3 [1–3]	<0.001
BSI score (n=195)[‡]	5 [3–8]	7 [5–11]	<0.001
30-day mortality	4 (1.5)	20 (9.0)	<0.001
In-hospital mortality	3 (1.1)	16 (7.2)	0.001
Length of hospital stay, days	6 [4–8]	10 [7–13]	<0.001

J Thorac Dis 2023;15(7):3636-3645

Factors associated hemoptysis

Variables	Univariate analysis			Multivariable analysis		
	Odds ratio	95% confidence interval	P value	Odds ratio	95% confidence interval	P value
Age	0.947	0.929–0.965	<0.001	0.987	0.964–1.011	0.294
Male	0.512	0.356–0.736	<0.001	0.436	0.221–0.858	0.016
Ever-smoker	0.636	0.442–0.914	0.014	1.888	0.945–3.772	0.072
ECOG ≥2	0.198	0.134–0.292	<0.001	0.248	0.153–0.401	<0.001
CCI ≥1	0.511	0.355–0.735	0.001	0.754	0.463–1.227	0.255
Pseudomonas aeruginosa colonization	0.338	0.157–0.727	0.006	0.308	0.119–0.795	0.015
Previous pulmonary tuberculosis	1.669	1.157–2.407	0.006	1.663	1.030–2.686	0.038
Involved lobes ≥3	0.309	0.209–0.457	<0.001	0.328	0.195–0.550	<0.001
Cystic bronchiectasis	0.434	0.301–0.625	<0.001	0.414	0.249–0.689	0.001
Mycetoma	3.643	1.775–7.481	<0.001	3.796	1.548–9.312	0.004
Emphysema	0.471	0.314–0.707	<0.001	0.531	0.297–0.950	0.033
Bronchial artery hypertrophy	1.592	1.078–2.351	0.020	3.373	2.002–5.684	<0.001

J Thorac Dis 2023;15(7):3636-3645

Predictors of 30-day mortality

Variables	Univariate analysis			Multivariable analysis		
	Odds ratio	95% confidence interval	P value	Odds ratio	95% confidence interval	P value
Age	1.076	1.027–1.127	0.002	1.023	0.964–1.085	0.452
Male	3.369	1.237–9.175	0.017	1.975	0.542–7.191	0.302
BMI <18.4 kg/m^2	6.062	2.428–15.139	<0.001	3.667	1.293–10.399	0.015
ECOG ≥2	17.637	4.098–75.907	<0.001	4.858	1.019–23.171	0.047
Sputum production	11.025	1.475–82.409	0.019	2.852	0.331–24.603	0.340
Dyspnea	9.504	2.210–40.880	0.002	1.291	0.232–7.192	0.771
Altered mental status	12.000	3.734–38.567	<0.001	6.221	1.440–26.869	0.014
No or minimal hemoptysis	6.478	2.180–19.248	0.001	5.321	1.266–22.369	0.023
Cystic bronchiectasis	3.202	1.303–7.868	0.011	3.142	0.963–10.248	0.058
Tuberculosis-destroyed lung	6.781	2.698–17.042	<0.001	5.766	1.642–20.249	0.006
Emphysema	3.446	1.503–7.899	0.003	1.510	0.481–4.739	0.481

J Thorac Dis 2023;15(7):3636-3645

The natural history of non-cavitary nodular bronchiectatic *Mycobacterium avium* complex lung disease

Byoung Soo Kwon[a], Jun Hee Lee[b], Younsuck Koh[a], Woo-Sung Kim[a], Jin-Woo Song[a], Yeon-Mok Oh[a], Sang-Do Lee[a], Sei Won Lee[a], Jae-Seung Lee[a], Chae-Man Lim[a], Chang-Min Choi[a], Jin-Won Huh[a], Sang-Bum Hong[a], Tae Sun Shim[a], Kyung-Wook Jo[a,*]

Characteristics	Total (n = 551)	Progressive group (n = 323)	Stationary group (n = 228)	*P* value
Age (years)	61.1 ± 10.4	60.0 ± 10.5	62.7 ± 10.2	0.002
Age ≤60 years	253 (45.9%)	166 (51.4%)	87 (38.2%)	0.002
Female gender	370 (67.2%)	224 (69.3%)	146 (64.0%)	0.191
BMI (kg/m^2)	20.4 ± 5.0	20.5 ± 2.8	20.1 ± 7.0	0.373
Current or former smoker	129 (23.5%)	71 (22.1%)	58 (25.6%)	0.351
History of pulmonary TB	168 (30.6%)	105 (32.5%)	63 (27.9%)	0.246
Comorbidity				
Malignancy	125 (22.7%)	69 (21.4%)	56 (24.7%)	0.362
COPD	72 (13.1%)	35 (10.9%)	37 (16.2%)	0.069
Diabetes mellitus	60 (10.9%)	31 (9.6%)	29 (12.7%)	0.247
Chronic liver disease	43 (7.8%)	21 (6.5%)	22 (9.7%)	0.173
Use of immunosuppressant	25 (4.6%)	15 (4.7%)	10 (4.5%)	0.936
Chronic heart disease	10 (1.8%)	5 (1.5%)	5 (2.2%)	0.748
Chronic kidney disease	7 (1.3%)	3 (0.9%)	4 (1.8%)	0.455
Organ transplantation	7 (1.3%)	6 (1.9%)	1 (0.4%)	0.248
ILD	6 (1.3%)	3 (0.9%)	3 (2.1%)	0.379
Respiratory symptoms				
Cough	286 (56.9%)	175 (61.4%)	111 (50.9%)	0.019
Sputum	284 (56.2%)	158 (55.2%)	126 (57.5%)	0.607
Hemoptysis	165 (32.7%)	87 (30.5%)	78 (35.5%)	0.242
Dyspnea	77 (15.3%)	38 (13.4%)	39 (17.8%)	0.171
Any systemic symptoms[a]	109 (21.7%)	80 (28.2%)	29 (13.3%)	< 0.001
Positive AFB smear	168 (30.7%)	119 (37.0%)	49 (21.7%)	< 0.001
Causative organism				0.001
Mycobacterium avium	333 (60.4%)	176 (54.5%)	157 (68.9%)	
Mycobacterium intracellulare	218 (39.6%)	147 (45.5%)	71 (31.1%)	
No. of involved lobes ≥4	185 (40.0%)	139 (43.6%)	46 (32.2%)	0.021

Respir Med 2019; 150: 45-50

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journal homepage: www.elsevier.com/locate/rmed

Original Research

Clinically significant hemoptysis and all-cause mortality in patients with nontuberculous mycobacterial pulmonary disease☆

Kwonhyung Hyung [a], Sung A Kim [a], Nakwon Kwak [a,b], Jae-Joon Yim [a,b], Joong-Yub Kim [c,d,*]

[a] Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine, Seoul National University Hospital, Seoul, Republic of Korea
[b] Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Republic of Korea
[c] Biomedical Research Institute, Seoul National University Hospital, Seoul, Republic of Korea
[d] Department of Microbiology, Harvard Medical School, Boston, United States

- ✓ **Patients with NTM PD in a prospective observational cohort between July 2011 and May 2023**
- ✓ **Clinically significant hemoptysis events were defined as those requiring more invasive procedures such as BAE or surgical resection in addition to medical management.**
- ✓ **Among 506 patients from the ongoing cohort, 43 patients (8.5 %) experienced clinically significant hemoptysis during a median follow-up of 5.1 years**

Respiratory Medicine 237 (2025) 107946

Table 2
Factors associated with incidence of clinically significant hemoptysis.

	Incidence rate ratio	95 % confidence interval	*P*-value
History of tuberculosis	1.91	1.02–3.60	0.04
SGRQ	1.02	0.99–1.04	0.10
Reported hemosputum at enrollment	1.40	0.63–3.12	0.41
ESR, per 10 mm/h	1.15	0.99–1.35	0.07
CRP, per 1 mg/dl	1.20	1.01–1.43	0.04
FVC % predicted, per 10 %	0.81	0.66–0.98	0.03

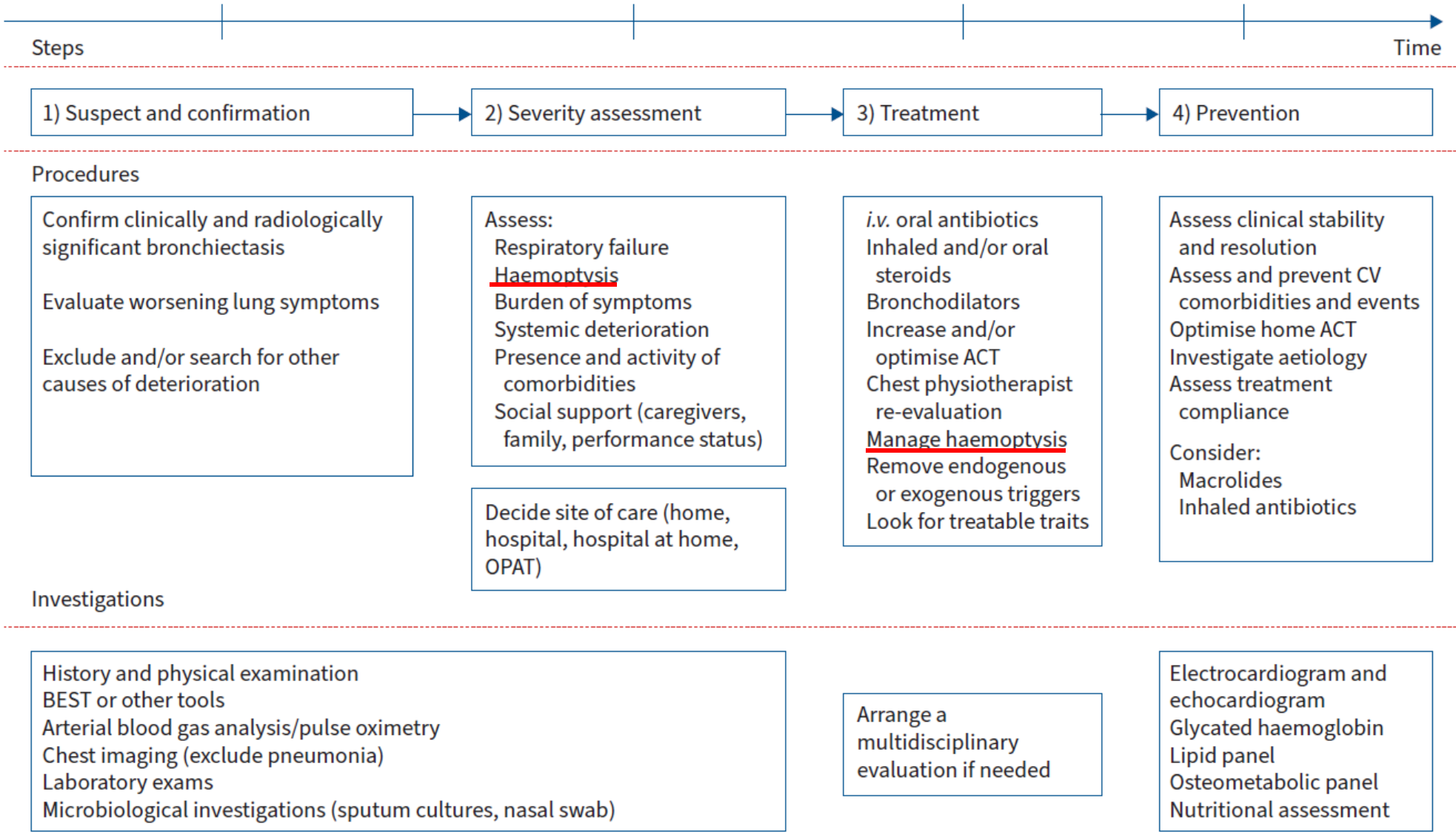
Table 3
Association between clinically significant hemoptysis and mortality in patients with NTM-PD.

	Hazard ratio	95 % confidence interval	*P*-value
Unadjusted	2.32	1.13–4.75	0.02
Model 1	2.39	1.31–4.36	0.005
Model 2	2.35	1.20–4.30	0.01
Model 3	2.64	1.43–4.88	0.002

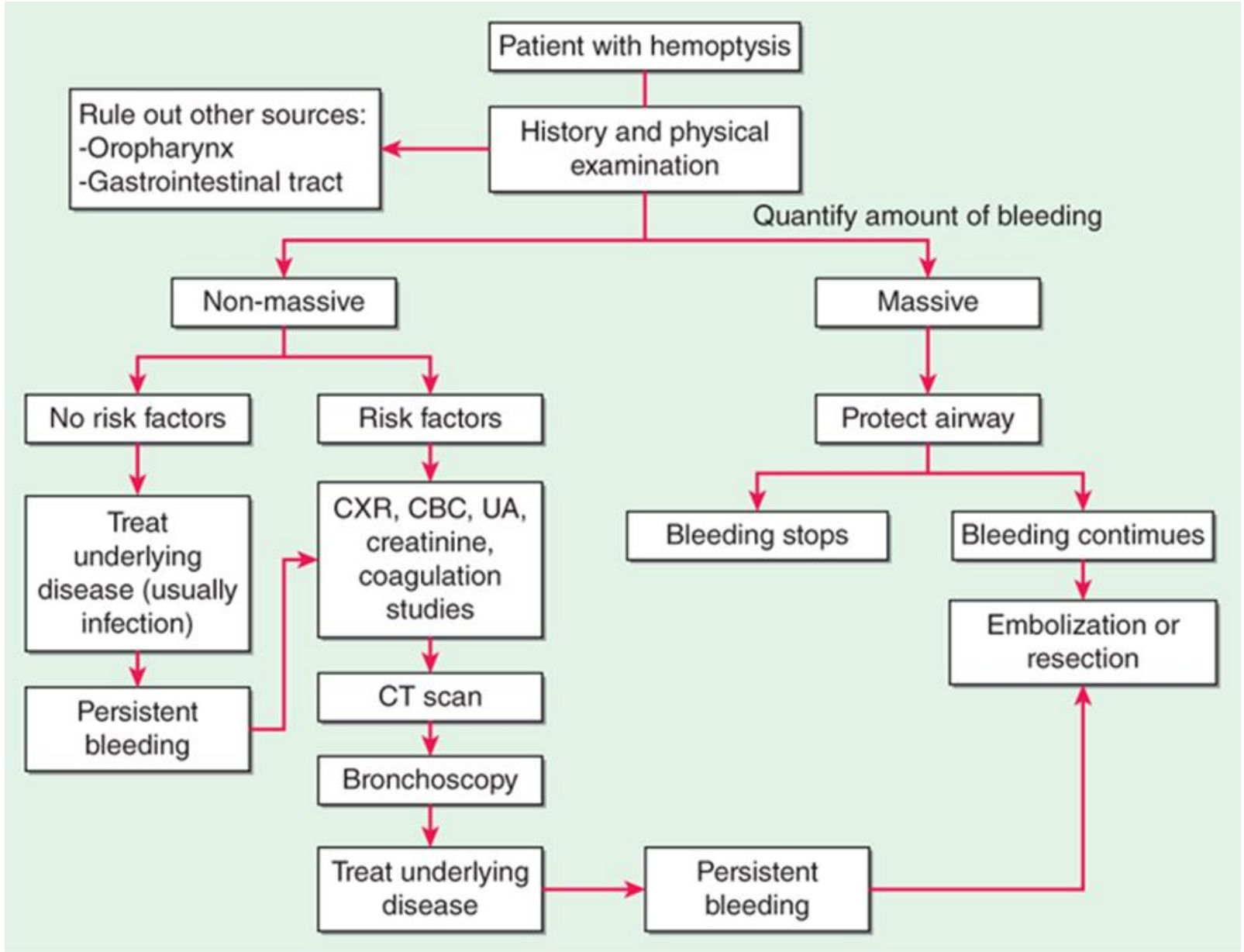
Model 1: adjusted for BMI <18.5 kg/m2, age ≥65 years, presence of cavity, ESR elevation, and sex.
Model 2: adjusted for BACES score, acid-fast bacilli smear positivity, and causative species (categorized as NTM species other than *M. intracellulare* or *M. abscessus* subsp. *abscessus*, *M. intracellulare*, or *M. abscessus* subsp. *abscessus*) [9].
Model 3: adjusted for BACES score, comorbidities (chronic obstructive pulmonary disease, malignancy), and % predicted forced vital capacity <80 %. Nineteen patients with unavailable spirometry result were excluded in model 3 analysis.

Management

Comprehensive management pathway for bronchiectasis



Eur Respir Rev 2024; 33: 240085



Harrison's Principles of Internal Medicine, 20th Edition

British Thoracic Society Guideline for bronchiectasis in adults

What are the complications of bronchiectasis?

Good practice point

- ✓ If haemoptysis 10 mls or less over a 24 hour period, treat with an appropriate oral antibiotic. If clinical deterioration, arrange emergency admission to hospital.
- ✓ Management of major haemoptysis should be multidisciplinary with involvement of respiratory physicians, interventional radiology and thoracic surgeons. Empirically treat patients with intravenous antibiotic therapy, based on their known microbiology, and consider adjunct treatment with tranexamic acid. Bronchial artery embolisation is the recommended first line treatment if significant haemoptysis persists.

Thorax 2019;74(Suppl 1):1–69

Bronchoscopy

- **Identify the anatomic site and side of the bleeding**
- **Assess the nature of the bleeding source (endobronchial lesion, central vascular fistulas [ie, Dieulafoy's disease of the bronchus], *vs* parenchymal)**
- **Assess the severity of bleeding**
- **Evaluate the feasibility of therapeutic bronchoscopic intervention if required**
- **Collect samples for cytologic, pathologic, and microbiologic purposes, which will impact the treatment and prognosis**

Diagnostic Yield of Bronchial Washing Fluid Analysis for Hemoptysis in Patients with Bronchiectasis

Ju-Hee Park,[1,2] Soo Jung Kim,[1,2] Ae-Ra Lee,[1,2] Jung-Kyu Lee,[1,2] Junghyun Kim,[1,2] Hyo-Jeong Lim,[1,2]
Young Jae Cho[1,2] Jong Sun Park,[1,2] Ho Il Yoon,[1,2] Jae-Ho Lee,[1,2] Choon-Taek Lee,[1,2] and Sei Won Lee[1,2,3]

- ✓ **Retrospective observational study**
- ✓ **January 2006-December 2010**
- ✓ **Patients with bronchiectasis**
- ✓ **No definite cause of hemoptysis other than bronchiectasis**

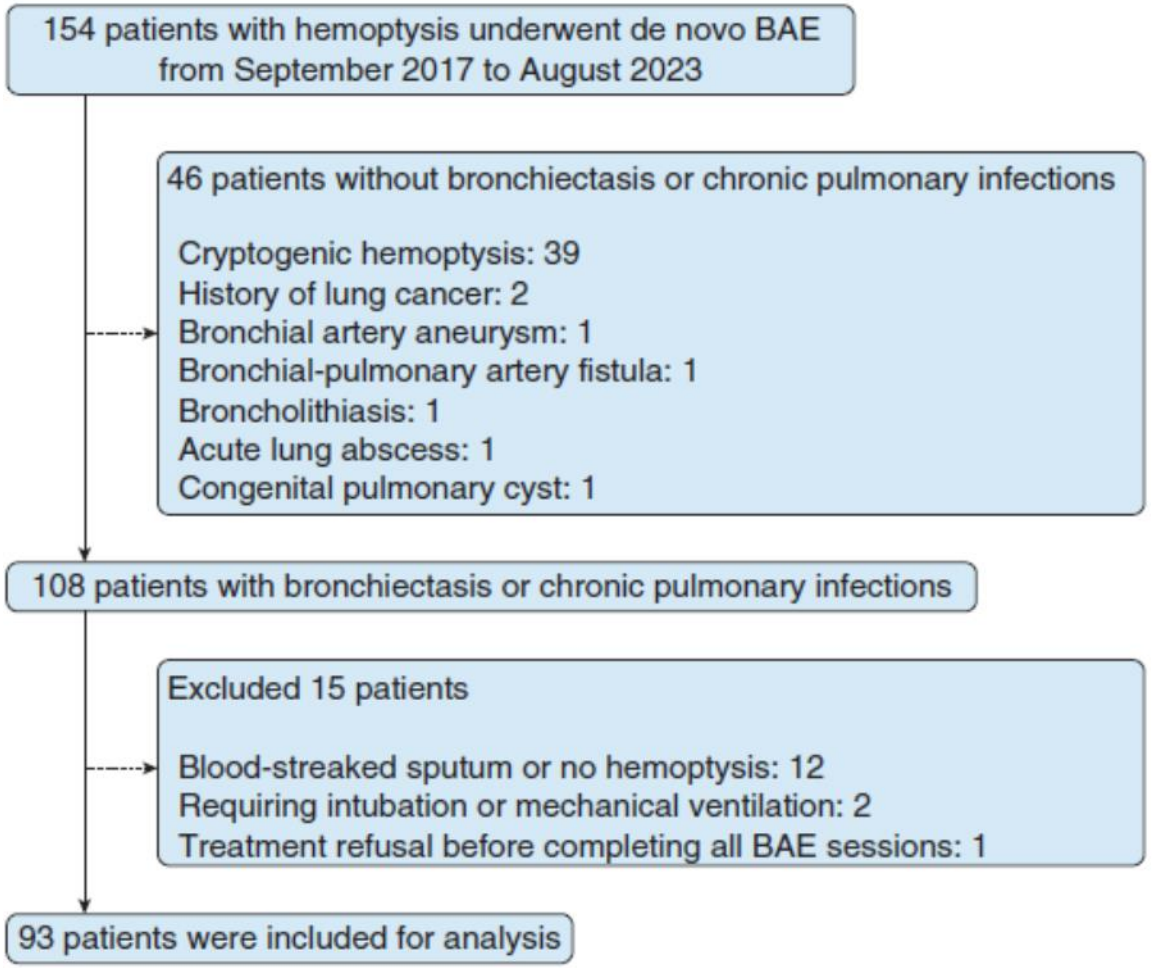
Clinical impact (n=130)	n (%)
Identification of bleeding site	53 (40.7)
Identification of bacteria	23 (17.7)
Isolated only from bronchial washing fluid	19 (14.6)
Antibiotic regimen changed due to the results of bronchial washing fluid analysis	1 (0.8)
Identification of non-tuberculous mycobacteria	27 (20.8)
Isolated only from bronchial washing fluid	14 (10.8)
Anti-non-tuberculous mycobacteria medication prescribed due to the results of bronchial washing fluid analysis	0 (0)
Identification of malignant cells	0 (0)

Yonsei Med J 2014; 55(3):739-745

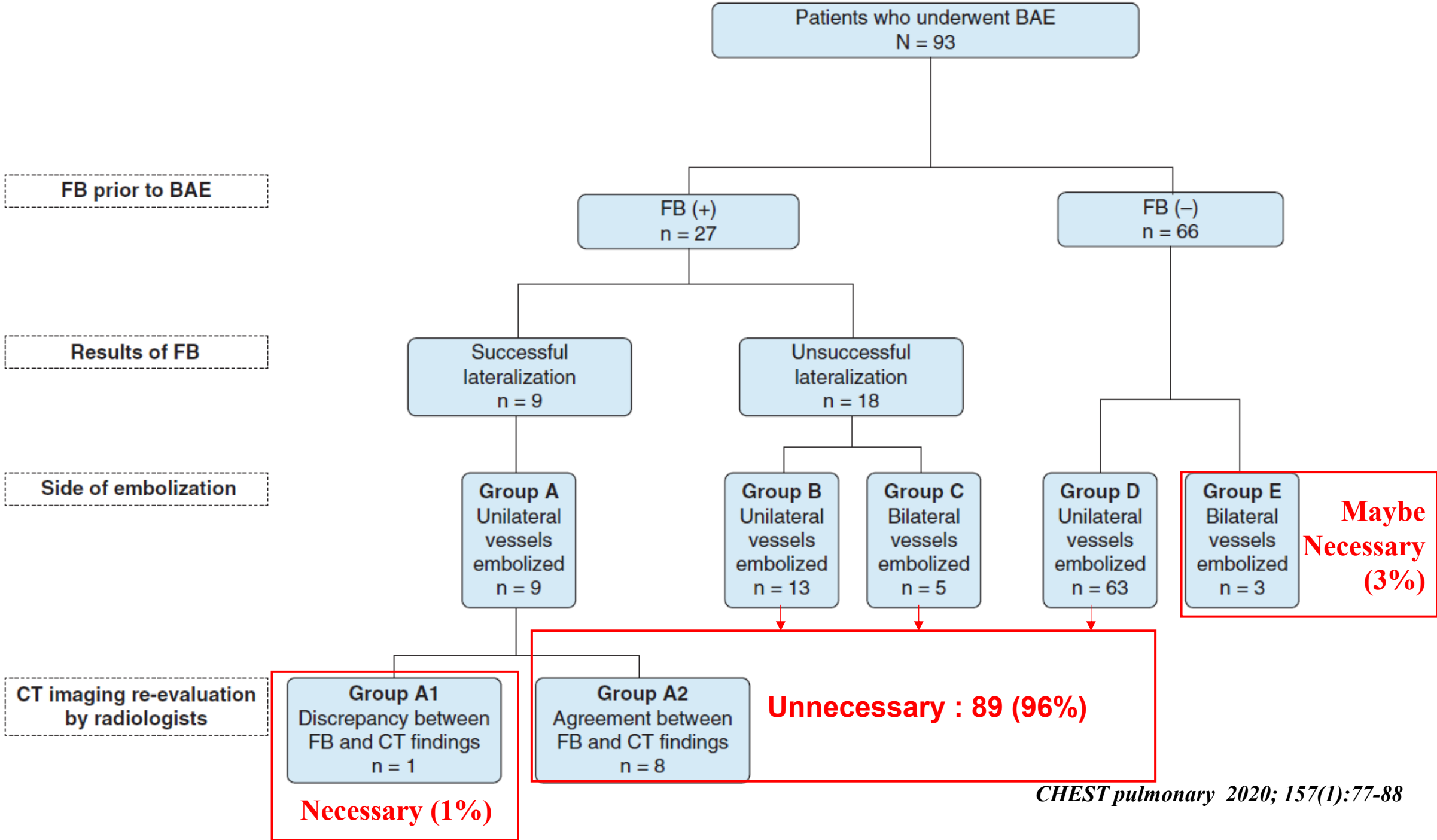
Reevaluating the Role of Bronchoscopy Prior to Bronchial Artery Embolization in Nonintubated Patients With Hemoptysis Due to Bronchiectasis and Chronic Pulmonary Infection

Takashi Nishihara, MD; Hideo Ishikawa, MD; Kazunari Tsuyuguchi, MD, PhD; Shoichi Fukuda, MD, PhD; and Hiromitsu Sumikawa, MD, PhD

- **Single-center, retrospective, observational study**
- **from September 2017 to August 2023**
- **93 consecutive nonintubated general ward patients with bronchiectasis and chronic pulmonary infection (nontuberculous mycobacteriosis, aspergillosis, and TB) who underwent de novo BAE**



CHEST pulmonary 2020; 157(1):77-88



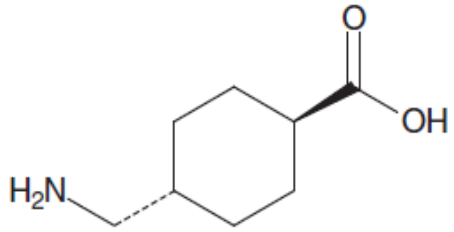
CHEST pulmonary 2020; 157(1):77-88

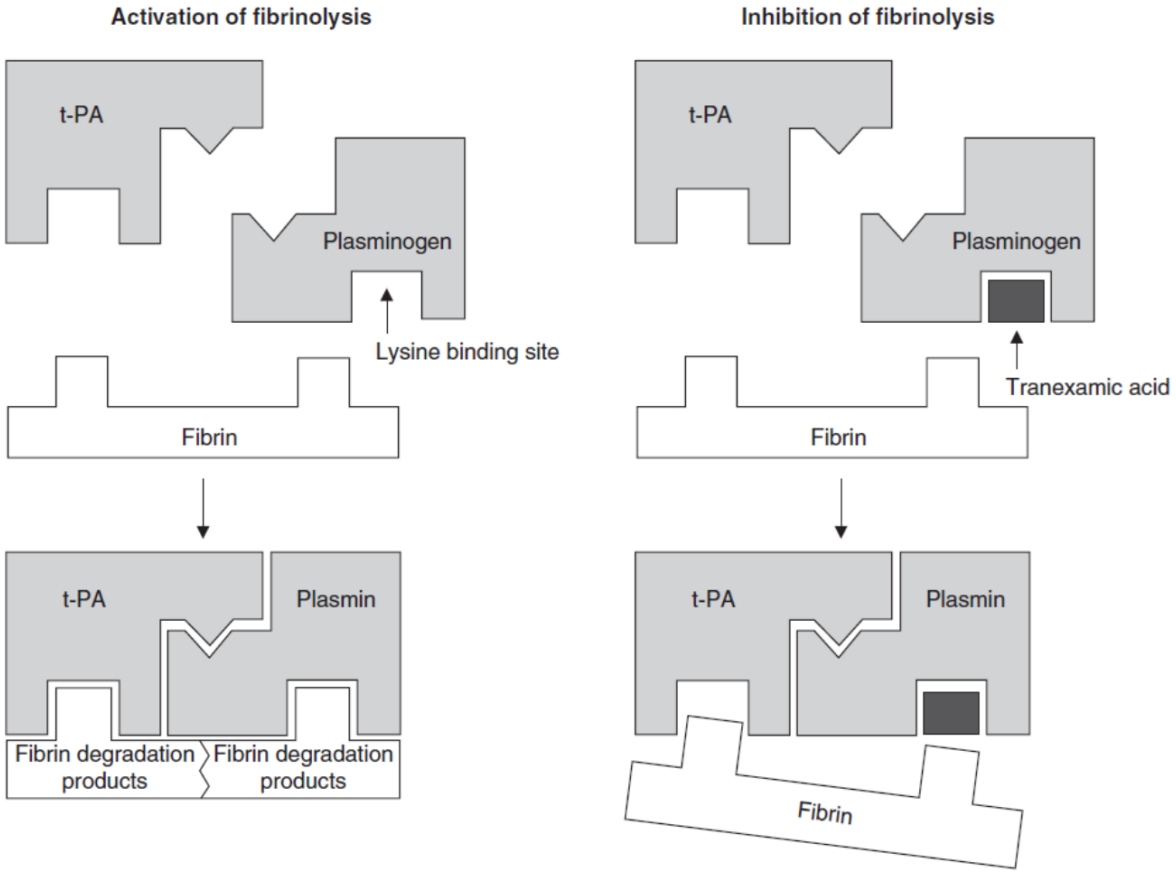
TABLE 2] Results of Bronchoscopy Prior to BAE

	Interval Between Last Hemoptysis		
	≤ 2 Days (n = 10)	> 2 Days (n = 17)	Total (N = 27)
Age, y	75.5 (74.25-77)	68 (64-74)	74 (64-76)
No. of male patients	3 (30)	5 (29)	8 (30)
Examination			
Observation only	4 (40)	4 (24)	8 (30)
Bacteriologic tests[a]	6 (60)	13 (76)	19 (70)
Findings			
Identification of the side of bleeding	7 (70)	2 (12)	9 (33)
Detection of new bacteria	1[b] (10)	4[c] (24)	5 (19)
Detection of malignancy	0 (0)	0 (0)	0 (0)
Complications	3[d] (30)	2[e] (12)	5 (19)

CHEST pulmonary 2020; 157(1):77-88

Tranexamic acid





- ✓ **Antifibrolytic agent, competitively inhibition of plasminogen activation**
- ✓ **Associated with a decrease in hemoptysis and need for interventional procedures**
- ✓ **Prompt and complete absorption post oral or intravenous dosing, with a half-life of approximately 2 h predominant renal elimination.**

Drugs 2012; 72 (5): 585-617

Does tranexamic acid reduce risk of mortality on patients with hemoptysis?

A protocol for systematic review and meta-analysis

Liang-Fu Chen, MD[a,b], Ting-Cheng Wang, MD[a,b], Ting-Yi Lin, MD[a,b], Po-Jia Pao, MD[a,b], Karen Chia-Wen Chu, MD[a,b], Chih-Hao Yang, MD[a,b], Jer-Hwa Chang, MD[c,d,e], Chin-Wang Hsu, MD[a,b], Chyi-Huey Bai, PhD[f], Yuan-Pin Hsu, MD[a,b,g,*]

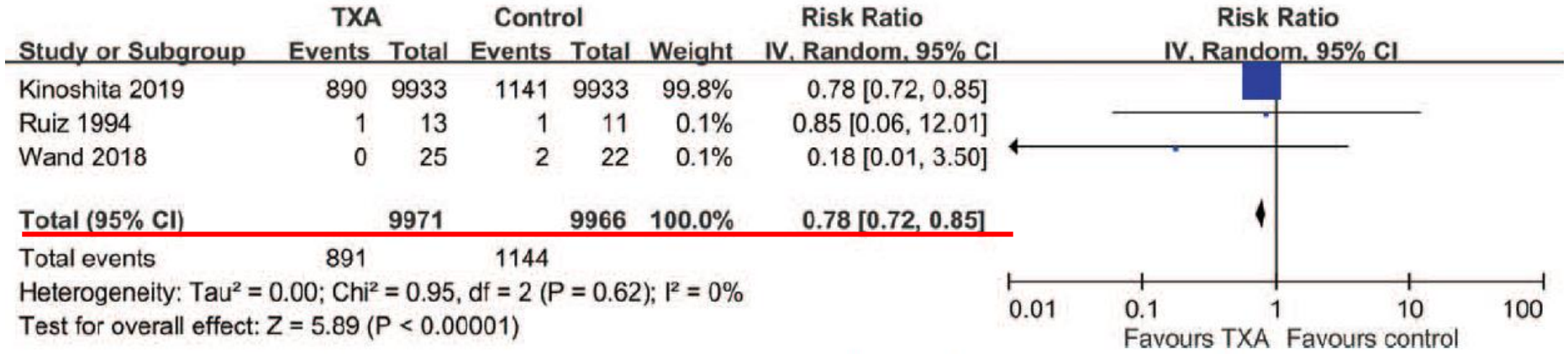


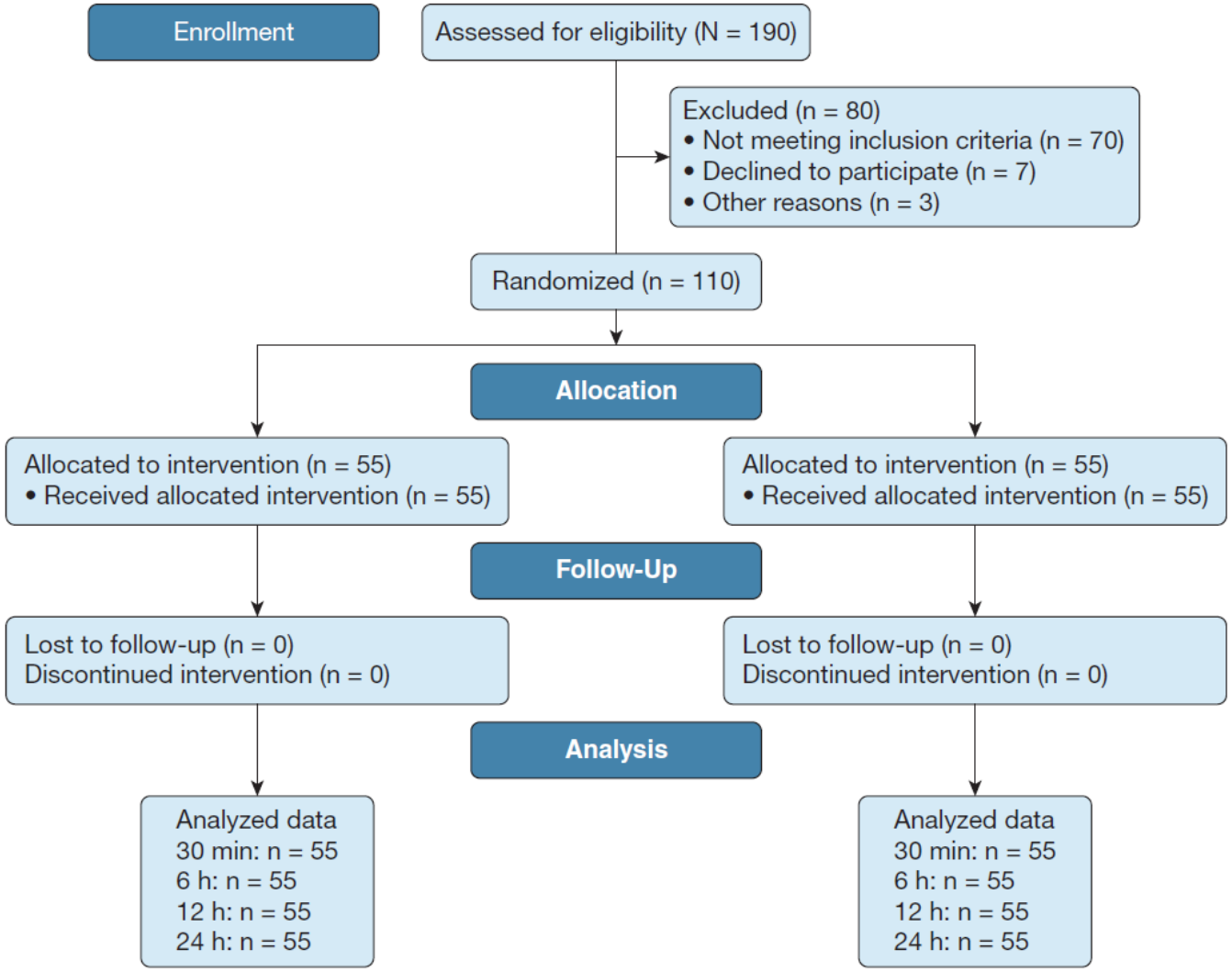
Figure 2. Meta-analysis evaluating the short-term mortality rate after tranexamic acid administration.

Meta-analysis of secondary outcome.

Outcome of interest	No. of studies	No. of patients	Effect sizes (95% CI)	*P*	I^2 (%)
Cessation of bleeding	2	70	RR, 1.44 (0.85 to 2.43)	.17	74
Time required to stop bleeding, h	2	70	MD, −24.61 (−35.96 to −13.26)	<.05*	0
Length of stay, days	3	19977	MD, −1.93 (−2.49 to −1.37)	<.05*	0
Length of stay (days), IV TXA subgroup	2	19930	MD, −1.93 (−2.49 to −1.39)	<.05*	0
Need for intervention	2	111	RR, 0.38 (0.16 to 0.87)	<.05*	0
Recurrence	3	135	RR, 0.40 (0.12 to 1.28)	.12	0

Nebulized vs IV Tranexamic Acid for Hemoptysis

A Pilot Randomized Controlled Trial



- ✓ **Pragmatic, open-label, randomized, parallel, single center, pilot trial of nebulized TA (500 mg tid) *vs* IV TA (500 mg tid) in adult patients presenting to the ED with active hemoptysis**
- ✓ **Exclusion: hemodynamically unstable or requiring immediate interventional procedure or mechanical ventilation**
- ✓ **The primary outcome: cessation of bleeding at 30 min.**

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Characteristic	IV Arm (n = 55)	Nebulization Arm (n = 55)
Age, mean ± SD, y	45.51 ± 14.09	40.34 ± 14.92
Male	43 (78.2)	34 (61.8)
Duration of hemoptysis, median (IQR), d	3 (2-7)	4 (2-5)
Approximate amount of hemoptysis 24 h prior to ED presentation, median (IQR), mL	100 (50-150)	100 (50-150)
Symptoms (other than hemoptysis)		
Fever	13 (23.64)	15 (27.27)
Cough	37 (67.27)	37 (67.27)
Weight loss over 2 wk	16 (29.09)	18 (32.73)
Other bleeding manifestation	4 (7.27)	0
Shortness of breath	14 (25.45)	1 (20)
Anticoagulants		
Warfarin	2 (3.63)	1 (1.81)
Antiplatelet	2 (3.63)	2 (3.63)
Comorbidities		
History of TB	41 (74.54)	35 (63.64)
Bronchiectasis	0	1 (1.82)
Carcinoma lung	4 (7.55)	3 (5.45)
Hypertension	4 (7.55)	6 (10.91)
Diabetes	8 (15.09)	4 (7.27)
Airway disease	6 (11.32)	4 (7.27)
Coronary artery disease	4 (7.27)	2 (3.64)
Diagnosis		
TB	43 (78.18)	41 (74.55)
Post-TB sequelae	41	35
Active pulmonary TB	2	5
Disseminated TB (active)	0	1
Lung malignancy	4 (7.27)	4 (7.27)
ABPA	15 (27.27)	14 (26.36)
Others	4	6

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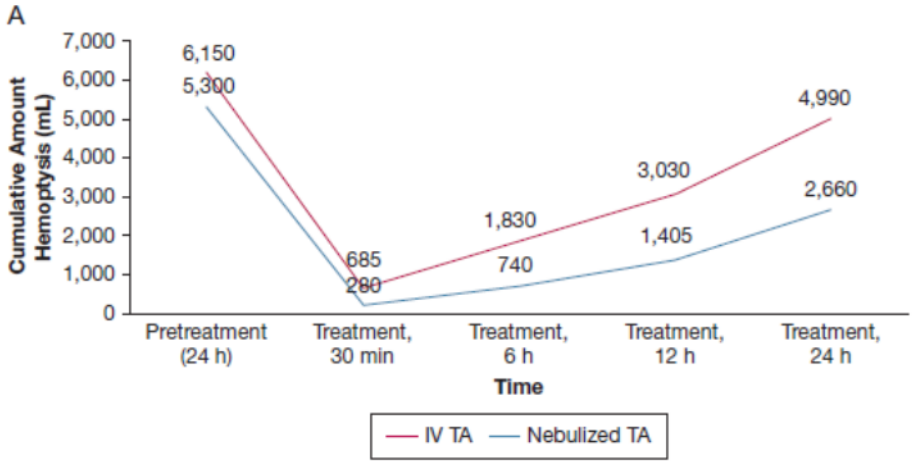

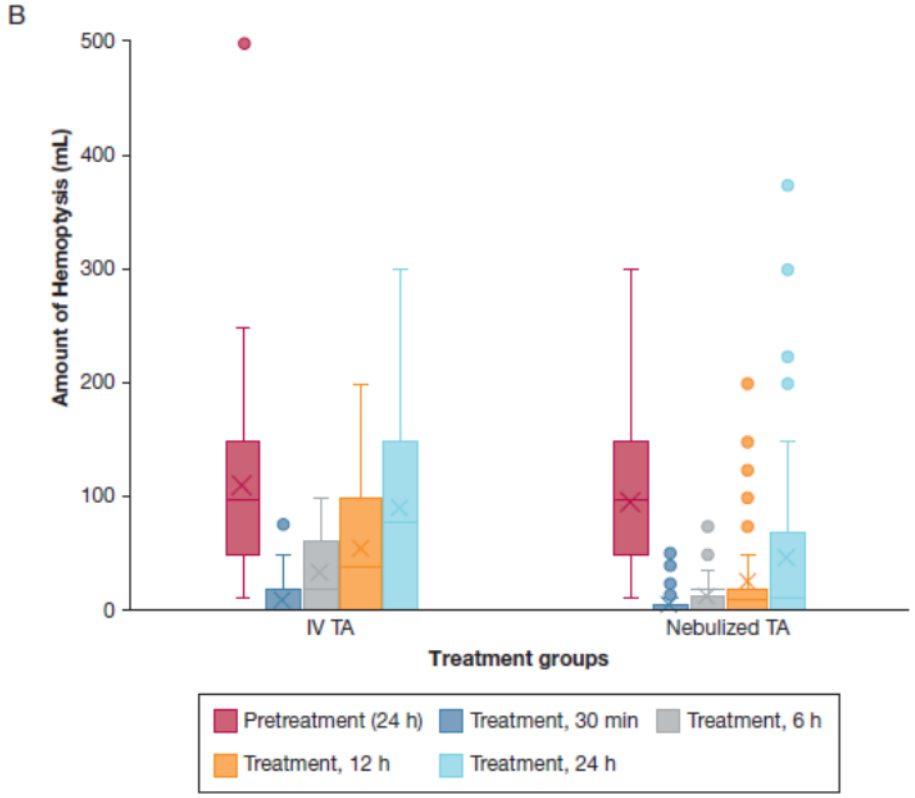

TABLE 2] Comparison of Hemoptysis Amount Between the Two Groups

Amount of Hemoptysis	Median (IQR), mL		*P* Value
	IV Arm (n = 55)	Nebulization Arm (n = 55)	
At 30 min	0 (0-20)	0 (0-5)	.011
At 6 h	20 (0-60)	5 (0-15)	.002
At 12 h	40 (0-100)	10 (0-20)	.0008
At 24 h	80 (0-150)	10 (0-70)	.005

TABLE 3] Comparison of Patient Management Between the Two Groups

Characteristic	IV Arm	Nebulization Arm	*P* Value
Bronchoscopy	2 (4.17)[a]	2 (3.70)[b]	1.000
CTBA	32 (66.67)[a]	27 (50)[b]	.110
BAE	21 (47.73)[c]	13 (25.49)[d]	.024
Adverse effects			
Bronchoconstriction	0	2	.22
Thromboembolism	0	0	
Anaphylaxis	0	0	
Disposition from ED			.005
Admitted	25 (60.98)[e]	17 (32.08)[f]	
Discharge	16 (39.02)[e]	36 (67.92)[f]	

CHEST 2023; 163(5):1176-1184

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Diagn Interv Radiol 2017; 23:307–317

INTERVENTIONAL RADIOLOGY
REVIEW

Bronchial artery embolization in hemoptysis: a systematic review

Most common indications for BAE : tuberculosis, post-tubercular sequelae, bronchiectasis, and aspergilloma

		Cumulative hemoptysis control rate (%)							
Author	Year	<1 month	1 month	1–3 months	6 months	1 year	2 years	3 years	5 years
Chun et al. (15)	2010	-	81.8	-	-	69.9	-	35.9	-
Shin et al. (7)	2011	-	94.4	-	-	76.1	62.9	51.4	-
Yoo et al. (26)	2011	-	91.4	-	-	83.4	-	76.7	56.8
Anuradha et al. (27)	2012	93.1	85.7	79.5	63.2	51	-	-	-
Hwang et al. (5)	2013	-	84.7	76.2	71.4	59.4	55.7	50.6	-
Pei et al. (8)	2014	86.6	84.8	-	78.6	75.9	-	-	-

Technical success of BAE varies from 81%–100%
Immediate clinical success of BAE varies from 70%–99%
Recurrence rate varies from 12%–57% with no decrease in recurrence rates with time

Complication of BAE

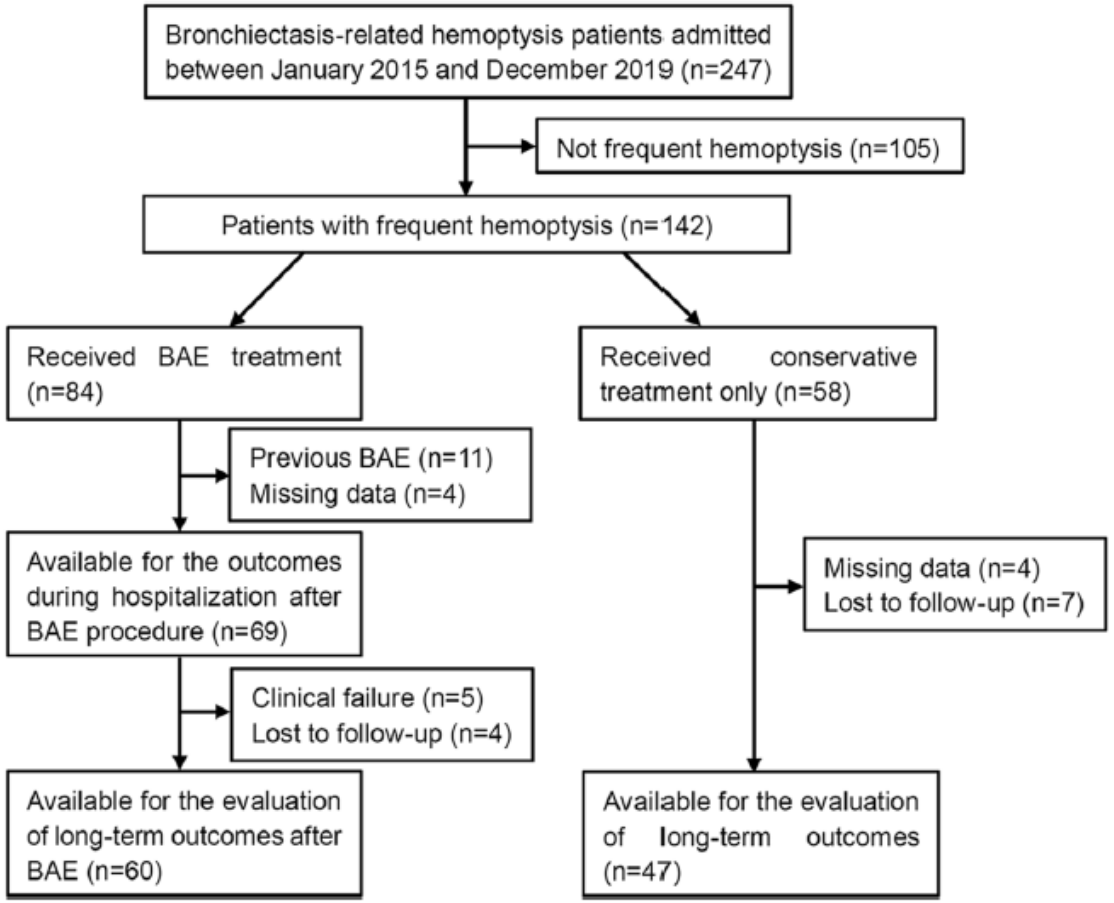
- **Temporary back pain, chest pain, dysphagia, and post-embolic syndrome (fever, leukocytosis, and pain)**
- **Vascular injury (at the access site, or at the bronchial artery):**

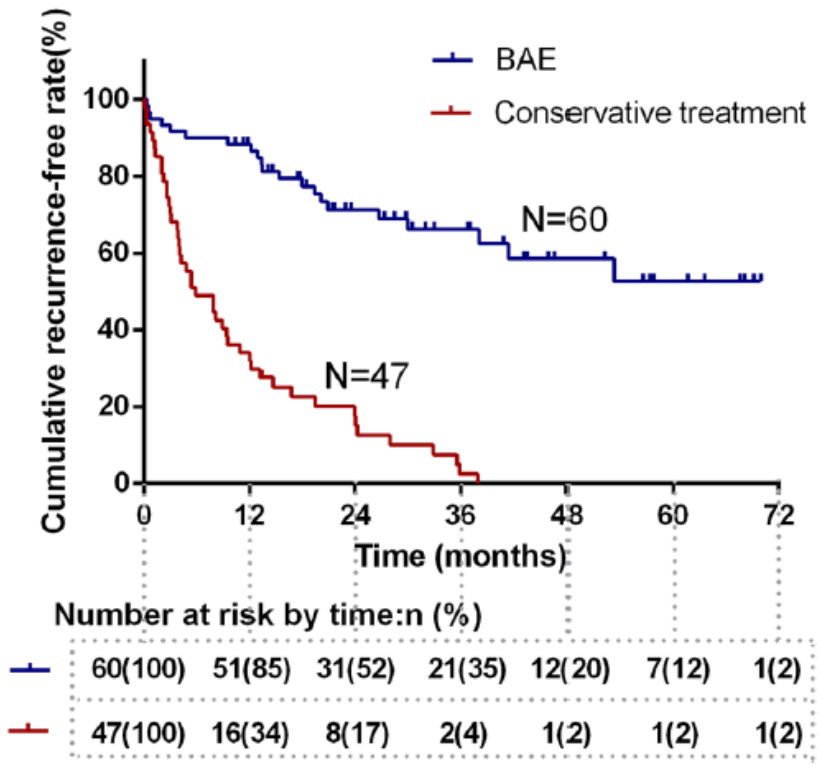
  pseudoaneurysm, dissection, or vessel perforation.
- **Non-target embolization, bronchoesophageal fistula and ischemic colitis, strokes**
- **Spinal cord ischemia: temporary or permanent paralysis with rates reported ranging from 0.19 to 6.5%**

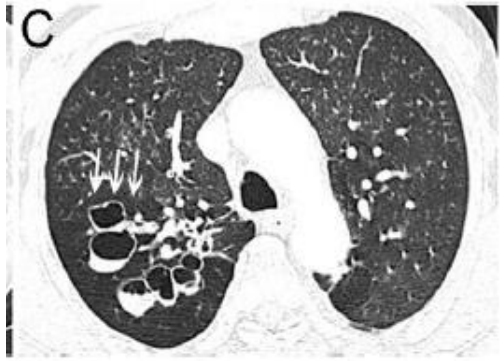
Semin Intervent Radiol 2022;39:210–217

Bronchial artery embolization for the management of frequent hemoptysis caused by bronchiectasis

Guang-Dong Lu†, Hai-Tao Yan†, Jin-Xing Zhang, Sheng Liu, Hai-Bin Shi and Qing-Quan Zu*







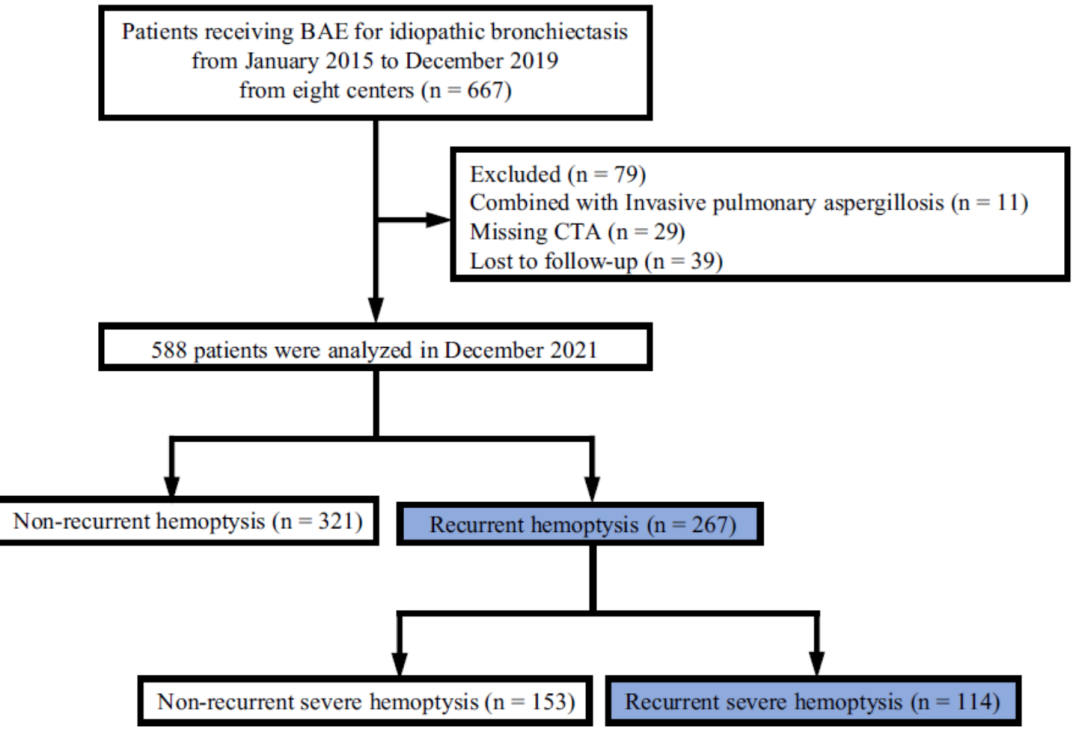
Risk factor for rebleeding

BAE : (HR), 0.18; 95% CI, 0.10–0.33; *P* < 0.001)

Bronchiectasis subtype (the level of cystic) : (HR, 1.740; 95% CI, 1.03–2.94; *P* = 0.039

BMC Pulmonary Medicine (2022) 22:394

Pseudomonas aeruginosa isolation is an important predictor for recurrent hemoptysis after bronchial artery embolization in patients with idiopathic bronchiectasis: a multicenter cohort study



Variables	Level	HR	95% CI	*P* Value
Duration of bronchiectasis, y		0.995	0.981 – 1.008	0.449
Duration of hemoptysis, y		1.010	0.996 – 1.023	0.155
24-h sputum valume	Few vs Minimal	1.277	0.876 – 1.863	0.204
	Medium vs Minimal	1.498	1.023 – 2.194	0.038 *
	Massive vs Minimal	1.985	1.253 – 3.145	0.003 **
Isolation of *P.aeruginosa*	Yes vs No	1.501	1.130 – 1.995	0.005 **
Number of bronchiectatic lobes	≥3 vs <3	1.996	1.290 – 3.087	0.002 **
Broncniectatic type	Cystic vs Cylindrical	0.812	0.494 – 1.336	0.412
	Mixed vs Cylindrical	0.869	0.573 – 1.318	0.508
Bronchoarterial ratio	2–3 times vs 1–2 times	1.118	0.758 – 1.649	0.574
	>3 times vs 1–2 times	1.381	0.977 – 1.951	0.068
Emphysema	Yes vs No	0.793	0.561 – 1.122	0.190
Abnormal inferior phrenic arteries	Yes vs No	0.980	0.760 – 1.265	0.879
Abnormal AbBAs on CTA	Yes vs No	1.452	1.094 – 1.926	0.010 *

Variables	Level	HR	95% CI	*P* Value
Age, y		1.020	1.003 – 1.037	0.018 *
Duration of bronchiectasis, y		0.993	0.972 – 1.014	0.489
Duration of hemoptysis, y		1.015	0.995 – 1.035	0.137
24-h sputum valume, mL	Few vs Minimal	1.148	0.627 – 2.099	0.655
	Medium vs Minimal	1.410	0.764 – 2.602	0.272
	Massive vs Minimal	1.442	0.696 – 2.986	0.325
Isolation of *P.aeruginosa*	Yes vs No	2.869	1.888 – 4.360	<0.001 ***
Number of bronchiectatic lobes	≥3 vs <3	1.071	0.597 – 1.923	0.817
Bronchoarterial ratio	2–3 times vs 1–2 times	1.512	0.865 – 2.671	0.155
	>3 times vs 1–2 times	1.412	0.836 – 2.385	0.197
Atelectasis	Yes vs No	1.148	0.766 – 1.719	0.504
Abnormal inferior phrenic arteries	Yes vs No	1.128	0.766 – 1.662	0.541
Abnormal AbBAs on CTA	Yes vs No	1.592	1.052 – 2.407	0.028 *

Respiratory Research (2023) 24:84

Efficiency and safety of surgical intervention to patients with Non-Cystic Fibrosis bronchiectasis: a meta-analysis

Li-Chao Fan[1], Shuo Liang[1], Hai-Wen Lu[1], Ke Fei[2,*] & Jin-Fu Xu[1,*]

- ✓ **The pooled mortality from 34 studies recruiting 4788 patients :1.5% (95% CI, 0.9–2.5%).**
- ✓ **The pooled morbidity from 33 studies consisting of 4583 patients: 16.7% (95% CI, 14.8–18.6%).**
- ✓ **The pooled proportion of patients from 35 studies, consisting of 4614 patients who were free of symptoms: 66.5% (95% CI, 61.3–71.7%) after surgery.**
- ✓ **The summary proportion of patients from 35 articles including 4279 participants who were improved : 27.5% (95% CI, 22.5–32.5%)**
- ✓ **No clinical improvement: 9.1% (95% CI, 7.3–11.5%)**

Sci Rep 2015; 5: 17382

British Thoracic Society Guideline for bronchiectasis in adults

The indications for surgical resection in bronchiectasis include

- persistent symptoms despite up to a year of comprehensive medical treatment,
- exacerbations that are either severe or frequent and interfere with social/professional life,
- recurrent refractory or massive haemoptysis,
- post obstruction bronchiectasis distal to tumours
- localised severely damaged lobe/segment that may be a source of sepsis that left in situ may lead to extension of lung damage.

Thorax 2019;74(Suppl 1):1–69

European Respiratory Society guidelines for the management of children and adolescents with bronchiectasis

Anne B. Chang [1,2], Rebecca Fortescue[3], Keith Grimwood[4,5], Efthymia Alexopoulou [6], Leanne Bell[7], Jeanette Boyd[8], Andrew Bush[9], James D. Chalmers[10], Adam T. Hill[11], Bulent Karadag[12], Fabio Midulla [13], Gabrielle B. McCallum [2], Zena Powell[7], Deborah Snijders[14], Woo-Jung Song[15], Thomy Tonia[16], Christine Wilson[17], Angela Zacharasiewicz [18] and Ahmad Kantar [19]

In children/adolescents with bronchiectasis, what factors should be taken into account when considering surgical removal of the diseased lung?

Usual practice statement: It is important to emphasise that surgery is rarely undertaken in the panel's experience, although we are aware that it is not uncommon in some settings.
Surgery is only considered after maximal medical therapies (e.g. ACT, long-term antibiotics, etc.) have failed and the child/ adolescent's QoL remains significantly impaired.
When contemplated, a multidisciplinary approach is essential, and the decision should be based on the individual's clinical state and local surgical expertise.

Eur Respir J 2021; 58: 2002990

Summary

- Common clinical presentation (e.g Hx of TB, NTM-PD)
- One distinct clinical phenotype reflecting severity and activity
- Role of bronchoscopy: debatable
- Treatment: antibiotics, tranexamic acid, BAE, surgical resection
- Consideration of *Pseudomonas* eradication

경청해주셔서 감사합니다.