

### Supplementary File 1. Search strategies

#### 1) PubMed

- 1-1. PM-OCPD:5  
 1-2. PM-IPF:0  
 1-3. PM-Asthma:2  
 1-4. PM-bronchiectasis: 0

	No.	Search strategy
1-1.	#1	"pulmonary disease, chronic obstructive"[mesh]
	#2	"pulmonary disease, chronic obstructive" OR "chronic obstructive lung disease" OR "chronic obstructive pulmonary diseases" OR "coad" OR "copd" OR "chronic obstructive airway disease" OR "chronic obstructive pulmonary disease" OR "airflow obstruction, chronic" OR "airflow obstructions, chronic" OR "chronic airflow obstructions" OR "chronic airflow obstruction" OR "chronic airway obstruction" OR "chronic obstructive bronchopulmonary disease" OR "chronic obstructive lung disorder" OR "chronic obstructive pulmonary disorder" OR "chronic obstructive respiratory disease" OR "chronic pulmonary obstructive disease" OR "chronic pulmonary obstructive disorder" OR "lung chronic obstructive disease" OR "lung disease, chronic obstructive" OR "obstructive chronic lung disease" OR "obstructive chronic pulmonary disease" OR "obstructive lung disease, chronic" OR "pulmonary disorder, chronic obstructive"
1-2.	#3	"idiopathic pulmonary fibrosis"[mesh]
	#4	"idiopathic pulmonary fibrosis" OR "idiopathic pulmonary fibroses" OR "pulmonary fibroses, idiopathic" OR "idiopathic fibrosing alveolitis, chronic form" OR "pulmonary fibrosis, idiopathic" OR "usual interstitial pneumonia" OR "interstitial pneumonia, usual" OR "usual interstitial pneumonias" OR "interstitial pneumonitis, usual" OR "pneumonitides, usual interstitial" OR "pneumonitis, usual interstitial" OR "usual interstitial pneumonitides" OR "usual interstitial pneumonitis" OR "fibrosing alveolitis" OR "alveolitis, fibrosing" OR "chronic diffuse interstitial fibrosis" OR "chronic interstitial pneumonia" OR "diffuse interstitial fibrosis" OR "diffuse interstitial lung fibrosis" OR "diffuse interstitial pulmonary fibrosis" OR "diffuse lung fibrosis" OR "diffuse pulmonary fibrosis" OR "hamman rich disease" OR "hamman rich syndrome" OR "hamman-rich syndrome" OR "idiopathic fibrosing alveolitis" OR "idiopathic interstitial fibrosis" OR "idiopathic interstitial lung fibrosis" OR "idiopathic lung fibrosis" OR "interstitial fibrosis" OR "interstitial lung fibrosis" OR "interstitial pulmonary fibrosis" OR "ipf" OR "lung alveolar fibrosis" OR "lung fibrosing alveolitis" OR "lung fibrosis, interstitial" OR "lung interstitial fibrosis" OR "pulmonary fibrosis, interstitial" OR "pulmonary interstitial fibrosis"
1-3.	#5	"asthma"[mesh]
	#6	"asthmas" OR "bronchial asthma" OR "asthma, bronchial" OR "asthma bronchiale" OR "asthma pulmonale" OR "asthmatic" OR "asthmatic subject" OR "bronchus asthma" OR "childhood asthma" OR "chronic asthma" OR "lung allergy" OR "asthma"
1-4.	#7	"bronchiectasis"[mesh]
	#8	"bronchiectasis" OR "bronchiectases" OR "saccular bronchiectasis" OR "bronchiectasis, saccular" OR "saccular bronchiectases" OR "cystic bronchiectasis" OR "bronchiectasis, cystic" OR "cystic bronchiectases" OR "cylindrical bronchiectasis" OR "bronchiectasis, cylindrical" OR "cylindrical bronchiectases" OR "varicose bronchiectasis" OR "bronchiectasis, varicose" OR "varicose bronchiectases" OR "bronchiectasia" OR "bronchoectasia"
PM	#9	"particulate matter"[mesh]
	#10	"particulate matter" OR "airborne particulate matter" OR "particulate matter, airborne" OR "air pollutants, particulate" OR "particulate air pollutants" OR "ambient particulate matter" OR "particulate matter, ambient" OR "ultrafine particulate matter" OR "particulate matter, ultrafine" OR "ultrafine particles" OR "particles, ultrafine" OR "ultrafine particle" OR "particle, ultrafine"
Biomarkers	#11	"biomarkers"[mesh]

Supplementary File 1. Continued

No.	Search strategy
#12	"Biomarkers" OR "marker, biological" OR "biological marker" OR "biologic marker" OR "marker, biologic" OR "biological markers" OR "biologic markers" OR "markers, biologic" OR "biomarker" OR "markers, biological" OR "markers, immunologic" OR "immune markers" OR "markers, immune" OR "marker, immunologic" OR "immunologic markers" OR "immune marker" OR "marker, immune" OR "immunologic marker" OR "serum markers" OR "markers, serum" OR "marker, serum" OR "serum marker" OR "surrogate endpoints" OR "endpoints, surrogate" OR "surrogate end point" OR "end point, surrogate" OR "surrogate end points" OR "end points, surrogate" OR "surrogate endpoint" OR "endpoint, surrogate" OR "markers, clinical" OR "clinical markers" OR "clinical marker" OR "marker, clinical" OR "biochemical marker" OR "markers, biochemical" OR "marker, biochemical" OR "biochemical markers" OR "markers, laboratory" OR "laboratory marker" OR "marker, laboratory" OR "surrogate markers" OR "markers, surrogate" OR "marker, surrogate" OR "surrogate marker" OR "laboratory markers"
#13	"incidence"[mesh]
#14	"incidence" OR "incidences" OR "secondary attack rate" OR "attack rate, secondary" OR "rate, secondary attack" OR "secondary attack rates" OR "incidence proportion" OR "incidence proportions" OR "proportion, incidence" OR "attack rate" OR "attack rates" OR "rate, attack" OR "cumulative incidence" OR "cumulative incidences" OR "incidence, cumulative" OR "incidence rate" OR "incidence rates" OR "rate, incidence" OR "person-time rate" OR "person time rate" OR "person-time rates" OR "rate, person-time"
#15	"Disease Progression"[Mesh]
#16	"disease progression" OR "progression, disease" OR "clinical course" OR "clinical progression" OR "progression, clinical" OR "disease exacerbation" OR "exacerbation, disease" OR "disease course" OR "disease attributes" OR "disease development" OR "disease evolution" OR "disease progressions" OR "progressions, disease"
#17	"clinical deterioration"[mesh]
#18	"clinical deterioration" OR "aggravation, disease" OR "disease aggravation" OR "disease flare" OR "disease progression" OR "exacerbation, disease" OR "disease exacerbation" OR "symptom flare up" OR "exaggeration, symptom" OR "magnification, symptom" OR "symptom worsening" OR "symptom exacerbations" OR "increase, symptom" OR "symptom increase" OR "symptom exaggeration" OR "symptom exaggerations" OR "symptom magnifications" OR "exacerbation, symptom" OR "symptom magnification" OR "symptom exacerbation" OR "worsening, symptom" OR "flare up, symptom" OR "flare ups, symptom" OR "symptom flareup" OR "flaring up, symptom" OR "flareup, symptom" OR "acute symptom flare" OR "symptom flare ups" OR "symptom flareups" OR "flare-up, symptom" OR "flareups, symptom" OR "symptom flare, acute" OR "symptom flare-up" OR "symptom flaring up" OR "acute symptom flares" OR "symptom flare-ups" OR "flare-ups, symptom"
1-1	#19 #1 OR #2
1-2	#20 #3 OR #4
1-3	#21 #5 OR #6
1-4	#22 #7 OR #8
PM	#23 #9 OR #10
Biomarkers	#24 #11 OR #12
	#25 #13 OR #14 OR #15 OR #16 OR #17 OR #18
1-1	#26 #19 AND #23 AND #24 AND #25 AND 2018/01/01:3000/12/31[Date – Publication]
1-2	#27 #20 AND #23 AND #24 AND #25 AND 2018/01/01:3000/12/31[Date – Publication]
1-3	#28 #21 AND #23 AND #24 AND #25 AND 2018/01/01:3000/12/31[Date – Publication]
1-4	#29 #22 AND #23 AND #24 AND #25 AND 2018/01/01:3000/12/31[Date – Publication]

**Supplementary File 1. Continued**

2) Ovid Embase

1-1. PM-COPD : 16

1-2. PM-IPF : 1

1-3. PM-Asthma : 16

1-4. PM-Bronchiectasis : 2

	No.	Search strategy
1-1.	#1	'chronic obstructive lung disease'/exp
	#2	'pulmonary disease, chronic obstructive' OR 'chronic obstructive lung disease' OR 'chronic obstructive pulmonary diseases' OR 'coad' OR 'copd' OR 'chronic obstructive airway disease' OR 'chronic obstructive pulmonary disease' OR 'airflow obstruction, chronic' OR 'airflow obstructions, chronic' OR 'chronic airflow obstructions' OR 'chronic airflow obstruction' OR 'chronic airway obstruction' OR 'chronic obstructive bronchopulmonary disease' OR 'chronic obstructive lung disorder' OR 'chronic obstructive pulmonary disorder' OR 'chronic obstructive respiratory disease' OR 'chronic pulmonary obstructive disease' OR 'chronic pulmonary obstructive disorder' OR 'lung chronic obstructive disease' OR 'lung disease, chronic obstructive' OR 'obstructive chronic lung disease' OR 'obstructive chronic pulmonary disease' OR 'obstructive lung disease, chronic' OR 'pulmonary disorder, chronic obstructive'
1-2.	#3	'fibrosing alveolitis'/exp
	#4	'idiopathic pulmonary fibrosis' OR 'idiopathic pulmonary fibroses' OR 'pulmonary fibroses, idiopathic' OR 'idiopathic fibrosing alveolitis, chronic form' OR 'pulmonary fibrosis, idiopathic' OR 'usual interstitial pneumonia' OR 'interstitial pneumonia, usual' OR 'usual interstitial pneumonias' OR 'interstitial pneumonitis, usual' OR 'pneumonitides, usual interstitial' OR 'pneumonitis, usual interstitial' OR 'usual interstitial pneumonitides' OR 'usual interstitial pneumonitis' OR 'fibrosing alveolitis' OR 'alveolitis, fibrosing' OR 'chronic diffuse interstitial fibrosis' OR 'chronic interstitial pneumonia' OR 'diffuse interstitial fibrosis' OR 'diffuse interstitial lung fibrosis' OR 'diffuse interstitial pulmonary fibrosis' OR 'diffuse lung fibrosis' OR 'diffuse pulmonary fibrosis' OR 'hamman rich disease' OR 'hamman rich syndrome' OR 'hamman-rich syndrome' OR 'idiopathic fibrosing alveolitis' OR 'idiopathic interstitial fibrosis' OR 'idiopathic interstitial lung fibrosis' OR 'idiopathic lung fibrosis' OR 'interstitial fibrosis' OR 'interstitial lung fibrosis' OR 'interstitial pulmonary fibrosis' OR 'ipf' OR 'lung alveolar fibrosis' OR 'lung fibrosing alveolitis' OR 'lung fibrosis, interstitial' OR 'lung interstitial fibrosis' OR 'pulmonary fibrosis, interstitial' OR 'pulmonary interstitial fibrosis'
1-3.	#5	'asthma'/exp
	#6	'asthmas' OR 'bronchial asthma' OR 'asthma, bronchial' OR 'asthma bronchiale' OR 'asthma pulmonale' OR 'asthmatic' OR 'asthmatic subject' OR 'bronchus asthma' OR 'childhood asthma' OR 'chronic asthma' OR 'lung allergy' OR 'asthma'
1-4.	#7	bronchiectasis/exp
	#8	'bronchiectasis' OR 'bronchiectases' OR 'saccular bronchiectasis' OR 'bronchiectasis, saccular' OR 'saccular bronchiectases' OR 'cystic bronchiectasis' OR 'bronchiectasis, cystic' OR 'cystic bronchiectases' OR 'cylindrical bronchiectasis' OR 'bronchiectasis, cylindrical' OR 'cylindrical bronchiectases' OR 'varicose bronchiectasis' OR 'bronchiectasis, varicose' OR 'varicose bronchiectases' OR 'bronchiectasia' OR 'bronchoectasia'
PM	#9	'particulate matter'/exp
	#10	'particulate matter' OR 'airborne particulate matter' OR 'particulate matter, airborne' OR 'air pollutants, particulate' OR 'particulate air pollutants' OR 'ambient particulate matter' OR 'particulate matter, ambient' OR 'ultrafine particulate matter' OR 'particulate matter, ultrafine' OR 'ultrafine particles' OR 'particles, ultrafine' OR 'ultrafine particle' OR 'particle, ultrafine'
Biomarkers	#11	'biological marker'/exp

Supplementary File 1. Continued

No.	Search strategy
#12	'Biomarkers' OR 'marker, biological' OR 'biological marker' OR 'biologic marker' OR 'marker, biologic' OR 'biological markers' OR 'biologic markers' OR 'markers, biologic' OR 'biomarker' OR 'markers, biological' OR 'markers, immunologic' OR 'immune markers' OR 'markers, immune' OR 'marker, immunologic' OR 'immunologic markers' OR 'immune marker' OR 'marker, immune' OR 'immunologic marker' OR 'serum markers' OR 'markers, serum' OR 'marker, serum' OR 'serum marker' OR 'surrogate endpoints' OR 'endpoints, surrogate' OR 'surrogate end point' OR 'end point, surrogate' OR 'surrogate end points' OR 'end points, surrogate' OR 'surrogate endpoint' OR 'endpoint, surrogate' OR 'markers, clinical' OR 'clinical markers' OR 'clinical marker' OR 'marker, clinical' OR 'biochemical marker' OR 'markers, biochemical' OR 'marker, biochemical' OR 'biochemical markers' OR 'markers, laboratory' OR 'laboratory marker' OR 'marker, laboratory' OR 'surrogate markers' OR 'markers, surrogate' OR 'marker, surrogate' OR 'surrogate marker' OR 'laboratory markers'
#13	incidence/exp
#14	'incidence' OR 'incidences' OR 'secondary attack rate' OR 'attack rate, secondary' OR 'rate, secondary attack' OR 'secondary attack rates' OR 'incidence proportion' OR 'incidence proportions' OR 'proportion, incidence' OR 'attack rate' OR 'attack rates' OR 'rate, attack' OR 'cumulative incidence' OR 'cumulative incidences' OR 'incidence, cumulative' OR 'incidence rate' OR 'incidence rates' OR 'rate, incidence' OR 'person-time rate' OR 'person time rate' OR 'person-time rates' OR 'rate, person-time'
#15	'disease course'/exp
#16	'disease progression' OR 'progression, disease' OR 'clinical course' OR 'clinical progression' OR 'progression, clinical' OR 'disease exacerbation' OR 'exacerbation, disease' OR 'disease course' OR 'disease attributes' OR 'disease development' OR 'disease evolution' OR 'disease progressions' OR 'progressions, disease'
#17	'disease exacerbation'/exp
#18	'clinical deterioration' OR 'aggravation, disease' OR 'disease aggravation' OR 'disease flare' OR 'disease progression' OR 'exacerbation, disease' OR 'disease exacerbation' OR 'symptom flare up' OR 'exaggeration, symptom' OR 'magnification, symptom' OR 'symptom worsening' OR 'symptom exacerbations' OR 'increase, symptom' OR 'symptom increase' OR 'symptom exaggeration' OR 'symptom exaggerations' OR 'symptom magnifications' OR 'exacerbation, symptom' OR 'symptom magnification' OR 'symptom exacerbation' OR 'worsening, symptom' OR 'flare up, symptom' OR 'flare ups, symptom' OR 'symptom flareup' OR 'flaring up, symptom' OR 'flareup, symptom' OR 'acute symptom flare' OR 'symptom flare ups' OR 'symptom flareups' OR 'flare-up, symptom' OR 'flareups, symptom' OR 'symptom flare, acute' OR 'symptom flare-up' OR 'symptom flaring up' OR 'acute symptom flares'
1-1	#19 #1 OR #2
1-2	#20 #3 OR #4
1-3	#21 #5 OR #6
1-4	#22 #7 OR #8
pm	#23 #9 OR #10
Biomarkers	#24 #11 OR #12
	#25 #13 OR #14 OR #15 OR #16 OR #17 OR #18
1-1	#26 #19 AND #23 AND #24 AND #25 AND [2018-2023]/py
1-2	#27 #20 AND #23 AND #24 AND #25 AND [2018-2023]/py
1-3	#28 #21 AND #23 AND #24 AND #25 AND [2018-2023]/py
1-4	#29 #22 AND #23 AND #24 AND #25 AND [2018-2023]/py

**Supplementary File 1. Continued**

3) Cochrane Library

1-1. PM-COPD : 6

1-2. PM-IPF : 0

1-3. PM-Asthma : 3

1-4. PM-Bronchiectasis : 0

	No.	Search strategy
1-1.	#1	mesh descriptor: [pulmonary disease, chronic obstructive] explode all trees
	#2	pulmonary disease, chronic obstructive OR chronic obstructive lung disease OR chronic obstructive pulmonary diseases OR coad OR copd OR chronic obstructive airway disease OR chronic obstructive pulmonary disease OR airflow obstruction, chronic OR airflow obstructions, chronic OR chronic airflow obstructions OR chronic airflow obstruction OR chronic airway obstruction OR chronic obstructive bronchopulmonary disease OR chronic obstructive lung disorder OR chronic obstructive pulmonary disorder OR chronic obstructive respiratory disease OR chronic pulmonary obstructive disease OR chronic pulmonary obstructive disorder OR lung chronic obstructive disease OR lung disease, chronic obstructive OR obstructive chronic lung disease OR obstructive chronic pulmonary disease OR obstructive lung disease, chronic OR pulmonary disorder, chronic obstructive
1-2.	#3	MeSH descriptor: [Idiopathic Pulmonary Fibrosis] explode all trees
	#4	('idiopathic pulmonary fibrosis' OR 'idiopathic pulmonary fibroses' OR 'pulmonary fibroses, idiopathic' OR 'idiopathic fibrosing alveolitis, chronic form' OR 'pulmonary fibrosis, idiopathic' OR 'usual interstitial pneumonia' OR 'interstitial pneumonia, usual' OR 'usual interstitial pneumonias' OR 'interstitial pneumonitis, usual' OR 'pneumonitides, usual interstitial' OR 'pneumonitis, usual interstitial' OR 'usual interstitial pneumonitides' OR 'usual interstitial pneumonitis' OR 'fibrosing alveolitis' OR 'alveolitis, fibrosing' OR 'chronic diffuse interstitial fibrosis' OR 'chronic interstitial pneumonia' OR 'diffuse interstitial fibrosis' OR 'diffuse interstitial lung fibrosis' OR 'diffuse interstitial pulmonary fibrosis' OR 'diffuse lung fibrosis' OR 'diffuse pulmonary fibrosis' OR 'hamman rich disease' OR 'hamman rich syndrome' OR 'hamman-rich syndrome' OR 'idiopathic fibrosing alveolitis' OR 'idiopathic interstitial fibrosis' OR 'idiopathic interstitial lung fibrosis' OR 'idiopathic lung fibrosis' OR 'interstitial fibrosis' OR 'interstitial lung fibrosis' OR 'interstitial pulmonary fibrosis' OR 'ipf' OR 'lung alveolar fibrosis' OR 'lung fibrosing alveolitis' OR 'lung fibrosis, interstitial' OR 'lung interstitial fibrosis' OR 'pulmonary fibrosis, interstitial' OR 'pulmonary interstitial fibrosis')
1-3.	#5	mesh descriptor: [asthma] explode all trees
	#6	asthmas OR bronchial asthma OR asthma, bronchial OR asthma bronchiale OR asthma pulmonale OR asthmatic OR asthmatic subject OR bronchus asthma OR childhood asthma OR chronic asthma OR lung allergy OR asthma
1-4.	#7	mesh descriptor: [bronchiectasis] explode all trees
	#8	bronchiectasis OR bronchiectases OR saccular bronchiectasis OR bronchiectasis, saccular OR saccular bronchiectases OR cystic bronchiectasis OR bronchiectasis, cystic OR cystic bronchiectases OR cylindrical bronchiectasis OR bronchiectasis, cylindrical OR cylindrical bronchiectases OR varicose bronchiectasis OR bronchiectasis, varicose OR varicose bronchiectases OR bronchiectasia OR bronchoectasia
PM	#9	mesh descriptor: [particulate matter] explode all trees
	#10	particulate matter OR airborne particulate matter OR particulate matter, airborne OR air pollutants, particulate OR particulate air pollutants OR ambient particulate matter OR particulate matter, ambient OR ultrafine particulate matter OR particulate matter, ultrafine OR ultrafine particles OR particles, ultrafine OR ultrafine particle OR particle, ultrafine
Biomarkers	#11	mesh descriptor: [biomarkers] explode all trees

Supplementary File 1. Continued

No.	Search strategy
#12	Biomarkers OR marker, biological OR biological marker OR biologic marker OR marker, biologic OR biological markers OR biologic markers OR markers, biologic OR biomarker OR markers, biological OR markers, immunologic OR immune markers OR markers, immune OR marker, immunologic OR immunologic markers OR immune marker OR marker, immune OR immunologic marker OR serum markers OR markers, serum OR marker, serum OR serum marker OR surrogate endpoints OR surrogate end point OR end point, surrogate OR surrogate end points OR end points, surrogate OR surrogate endpoint OR endpoint, surrogate OR markers, clinical OR clinical markers OR clinical marker OR marker, clinical OR biochemical marker OR markers, biochemical OR marker, biochemical OR biochemical markers OR markers, laboratory OR laboratory marker OR marker, laboratory OR surrogate markers OR markers, surrogate OR surrogate marker OR laboratory markers
#13	mesh descriptor: [incidence] explode all trees
#14	incidence OR incidences OR secondary attack rate OR attack rate, secondary OR rate, secondary attack OR secondary attack rates OR incidence proportion OR incidence proportions OR proportion, incidence OR attack rate OR attack rates OR rate, attack OR cumulative incidence OR cumulative incidences OR incidence, cumulative OR incidence rate OR incidence rates OR rate, incidence OR person-time rate OR person time rate OR person-time rates OR rate, person-time
#15	mesh descriptor: [disease progression] explode all trees
#16	disease progression OR progression, disease OR clinical course OR clinical progression OR progression, clinical OR disease exacerbation OR exacerbation, disease OR disease course OR disease attributes OR disease development OR disease evolution OR disease progressions OR progressions, disease
#17	mesh descriptor: [symptom flare up] explode all trees
#18	clinical deterioration OR aggravation, disease OR disease aggravation OR disease flare OR disease progression OR exacerbation, disease OR disease exacerbation OR symptom flare up OR exaggeration, symptom OR magnification, symptom OR symptom worsening OR symptom exacerbations OR increase, symptom OR symptom increase OR symptom exaggeration OR symptom exaggerations OR symptom magnifications OR exacerbation, symptom OR symptom magnification OR symptom exacerbation OR worsening, symptom OR flare up, symptom OR flare ups, symptom OR flaring up, symptom OR flareup, symptom OR acute symptom flare OR symptom flare ups OR symptom flareups OR flare-up, symptom OR flareups, symptom OR symptom flare, acute OR symptom flare-up OR symptom flaring up OR acute symptom flares OR symptom flare-ups OR flare-ups, symptom
1-1	#19 #1 OR #2
1-2	#20 #3 OR #4
1-3	#21 #5 OR #6
1-4	#22 #7 OR #8
pm	#23 #9 OR #10
마커	#24 #11 OR #12
	#25 #13 OR #14 OR #15 OR #16 OR #17 OR #18
1-1	#26 #19 AND #23 AND #24 AND #25 with Publication Year from 2018 to 2023, in Trials
1-2	#27 #20 AND #23 AND #24 AND #25 with Publication Year from 2018 to 2023, in Trials
1-3	#28 #21 AND #23 AND #24 AND #25 with Publication Year from 2018 to 2023, in Trials
1-4	#29 #22 AND #23 AND #24 AND #25 with Publication Year from 2018 to 2023, in Trials