NHS Somerset

Respiratory Update 7th May 2026

Prescribing Leads Conference

Steve Holmes Declaration of Interests (1)

- General practitioner, Park Medical Practice, Shepton Mallet
- Somerset ICB Integrated Care Clinical Respiratory Lead / Integrated Care Lead
- NHS England (Educational Supervisor (trainer) and Appraiser)
- Primary Care Respiratory Society (Policy Lead; Service development and Conference committees)
- International Primary Care Respiratory Group (IPCRG) Education Committee Chair
- RCGP (Chair Severn Faculty Board) RCGP Rep for Taskforce for Lung Health and National Respiratory Audit Programme)
- British Thoracic Society (Education Committee and Specialist Advisory Group – COPD)

Declarations of Interest (2)

Speaker engagements, educational projects, conference attendance, advisory board work (in the last three years)

Academic work

University College, London; Universities of Birmingham, Cambridge, Edinburgh, NHS England

Other providers

Asthma and Lung UK, Best Practice, BTS, Doctorology, Education for Health, Guidelines in Practice, InterYem, MedAll, Mediconf, MIMS, Omniamed,Primary Care Cardiovascular Society, Pulse, RCGP Conferences, Respiratory Professional Care, Somerset GP Education Trust

Pharmaceutical / device companies

Aide Health, Astra Zeneca, Boehringer Ingelheim, Chiesi, Pfizer, Pulmonx, Sanofi, Teva, Trudell Medical International

No tobacco shares.

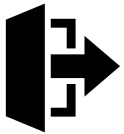
Managing the patient with COPD

- Undertreated Asthma
- Asthma COPD Overlap Syndrome
- Multimorbidity
- Triple Therapy for COPD
- Medications for COPD
- Exacerbations
- Other options for treatment

Living and dying with severe chronic obstructive pulmonary disease [1]

A story with no beginning

A middle that is a way of life



An unpredictable and unanticipated end

Pinnock H et al, Living and dying with severe chronic obstructive pulmonary disease: multi perspective longitudinal qualitative study. BMJ 2011; 342. Available from https://doi.org/10.1136/bmj.d142. Accessed January 2024

Guidelines and strategies for COPD

	NICE (2019)[1]	GOLD (2026)[2]
Guideline	Yes	No, report and strategy
Representative group on guideline	Yes (doctors, nurses, patients,other HCP, academics, researchers, across primary / secondary / tertiary boundaries)	No (all tertiary academic or doctors)
Academic Literature review	Yes systematic where area covered	Review of literature known to specialists (not systematic) or sent in by invitation
Last full update	2004	Unknown
Last partial update	2010, 2018, 2019	2024
Next guideline planned	uncertain	2026
Coverage	Comprehensive	Comprehensive
Drive	Clinical with aspirational / financial	Clinical, global, no pharma involvement in strategy declared now as an organisation

- 1 - National Institute for Health and Care Excellence. Chronic obstructive pulmonary disease in over 16s: diagnosis and management NICE guideline NG115. 2019.
- 2- Global Initiative for Chronic Obstructive Lung Disease (GOLD). (2026) Global Strategy for the Diagnosis, Management and Prevention of COPD (2025) Available from: https://goldcopd.org/

Poor adherence to prescribed asthma medications increases subsequent risk of COPD

- Used four databases (1998 – 1999 followed up until 2018)
- 68,211 people with asthma (mean age 48.2y)
- The 18-year incidence of COPD in asthma patients was 9.8 per 1000-persons year.

Results

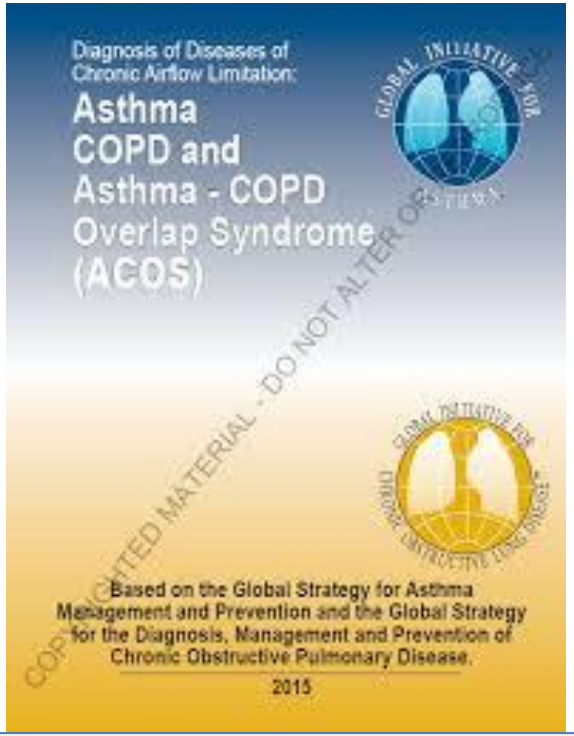
- High medication adherence significantly associated with decreased risk of COPD
- A significant increase in COPD risk was observed in severe asthma patients with low medication adherence (aHR: 1.72, 95% CI: 1.52-1.93), independent of other patient factors.

CONCLUSION: Optimal (≥ 0.80) and intermediate adherence (0.5 to 0.79) levels were associated with reduced risk of COPD incidence over time. Interventions aimed at improving adherence to prescribed medications in adult asthma patients should be intensified to reduce their risk of COPD.

Asamoah-Boaheng M, Farrell J, Bonsu KO, Oyet A, Midodzi WK. Association Between Medication Adherence and Risk of COPD in Adult Asthma Patients: A Retrospective Cohort Study in Canada. Clin Epidemiol. 2022;14:1241-54

Asthma COPD Overlap Syndrome

- A significant proportion of adult patients over age 40 who present with symptoms of a chronic airways disease have features of both asthma and COPD. Several diagnostic terms, most including the word ‘overlap’, have been applied to such patients, and the topic has been extensively reviewed. However, there is no generally agreed term or defining features for this category of chronic airflow limitation, although a definition based upon consensus has been published for overlap in patients with existing COPD.



GINA, GOLD. Diagnosis of Diseases of Chronic Airflow Limitation: Asthma, COPD and Asthma - COPD Overlap Syndrome (ACOS). 2014.

~~Asthma ... rome~~

- "We no longer refer to asthma & COPD overlap (ACO) instead we emphasize that asthma and COPD are different disorders, although they may share some common traits and clinical features (e.g. eosinophilia, some degree of reversibility). Asthma and COPD may co-exist in an individual patient. If a concurrent diagnosis of asthma is suspected pharmacotherapy should primarily follow asthma guidelines but pharmacological and non-pharmacological interventions may be needed for their COPD."

Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global Strategy for the Diagnosis, Management and Prevention of COPD (2020). 2019.

A person-centred clinical approach to the multimorbid patient with chronic obstructive pulmonary disease (COPD)

Patients with COPD, on average have five other morbidities that independently impact their quality of life, and increase mortality

Chronic Diseases Clusters

Using a modified Delphi method, we selected and clustered into 5 domains, the 20 most important diseases associated with COPD

Mental
- Depression and anxiety
- Cognitive impairment

Cardiovascular
- Systemic hypertension
- Heart failure
- Coronary artery disease
- Arrhythmia
- Pulmonary hypertension

Respiratory
- Lung cancer
- Asthma
- Sleep disordered breathing
- Interstitial lung disease
- Bronchiectasis

Metabolic diseases
- Diabetes mellitus
- Fatty liver
- Obesity
- Gastro-oesophageal reflux disease

Multiple organ loss of tissue (MOLT)
- Osteoporosis
- Sarcopenia
- Renal failure
- Anaemia

For each disease in those clusters, practical screening tools were selected to determine the presence, severity, and management

Multimorbidity Health Dashboard

In the absence of integrated multimorbidity guidelines, we provide links to selected guidelines and systematic reviews to direct appropriate management of the individual diseases

This expert consensus commentary summarises patient-centred recommendations to manage multimorbid COPD patients, aiming to improve quality-of-life and reduce disease burden through a holistic approach

Celli RB et al., A person-centred clinical approach to the multimorbid patient with COPD. Eur J Intern Med 2025

1. Celli BR, Fabbri LM, Yohannes AM, Hawkins NM, Criner GJ, Bon J, et al. A person-centred clinical approach to the multimorbid patient with COPD. European Journal of Internal Medicine. 2025;140:106424.

What are we doing about common chronic conditions in our patients?

Condition	Prevalence in Asthma	Prevalence in COPD
Gastro-oesophageal Reflux	59%	17-78%
Established Cardiovascular Disease	25%	30-60%
Osteoporosis	12-18%	38%
Sexual Dysfunction	F - 47-90% / M - 25%	68-81% (M= 74%)
Incontinence	45.6% (95% F)(in severe asthma)	30-50%
Anxiety	25% (49% in severe asthma)	30-36%
Depression	11-18%	27-40%
Heart Failure	2 x risk	20-30%
Atrial Fibrillation	9-15%	13%
Obesity (BMI greater than 30)	38%	28%
Diabetes Mellitus	16%	9%

1. REFERENCES ARE IN NOTES BUT TOO MANY TO PUT IN

How common are respiratory and other problems too?

Condition	Prevalence in Asthma	Prevalence in COPD
Bronchiectasis	15-67%	50% plus
Interstial Lung Disease	Data not found	Data not found
Exercise induced Bronchoconstriction	40-90%	40-90%
Rhinitis	80% plus	58-88%
Breathing Pattern Disorder	29-42%	30-50%
Inducible Laryngeal Obstruction	50%	Not known
Deconditioning	31-55%	93%
Obstructive Sleep Apnoea	19-60%	28%

1. REFERENCES ARE IN NOTES BUT TOO MANY TO PUT IN

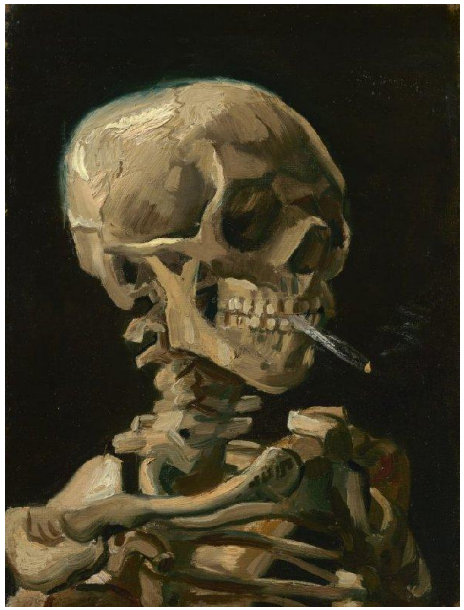
What is the point in treating COPD – times have changed - the positives?

ICS inhaled corticosteroid; **LABA** long-acting β_2-agonist; **LAMA** long-acting muscarinic antagonist; **QoL** quality of life

References: 1. National Institute for Clinical Excellence. NG 115 Chronic obstructive pulmonary disease in over 16s: diagnosis and management. NICE; 2019.; 2. Walters JA, et al. *Cochrane Database Syst Rev*. 2014;9:CD001288; 3. Vollenweider DJ et al, Antibiotics for exacerbations of chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews. 2018(10). 4. Kopsaftis Z et al, Influenza vaccine for chronic obstructive pulmonary disease (COPD). Cochrane Database of Systematic Reviews. 2018(6). 5. Walters JAE, et al Pneumococcal vaccines for preventing pneumonia in chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews. 2017(1). 6 Godtfredsen NS, et al. COPD-related morbidity and mortality after smoking cessation: status of the evidence. European Respiratory Journal. 2008;32(4):844-53. 7. Oba Y, Keeney E, et al, Dual combination therapy versus long-acting bronchodilators alone for chronic obstructive pulmonary disease (COPD): a systematic review and network meta-analysis. Cochrane Database of Systematic Reviews. 2018(12). 8. Horita N, et al. Long-acting muscarinic antagonist (LAMA) plus long-acting beta-agonist (LABA) versus LABA plus inhaled corticosteroid (ICS) for stable chronic obstructive pulmonary disease (COPD). Cochrane database of systematic reviews. 2017;2(2):CD012066-CD. 9. Puhan MA, Gimeno-Santos E, Cates CJ, Troosters T. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews. 2016(12)

Intervention	Cochrane Review Supportive (QOL/M/H / Exac)	National Guidance Supportive[1]
Steroids for exacerbation	Yes[2] **(QOL)**	Yes
Antibiotic for exacerbation	Yes[3] **(M in ICU)**	Yes
Influenza immunisation	Yes[4] **(Exac)**	Yes
Pneumococcal vaccination	Yes[5] **(Exac)**	Yes
Smoking cessation	Yes[6] **(QOL/M)**	Yes
LAMA	Yes[7] **(QOL/H / Exac)**	Yes
LABA/ICS	Yes[8] **(QOL/M/H/Exac)**	Yes
LAMA /LABA	Yes[7] **(QOL/H /Exac)**	Yes
Pulmonary rehabilitation	Yes[9] **(QOL)**	Yes

The first line triple therapy in COPD



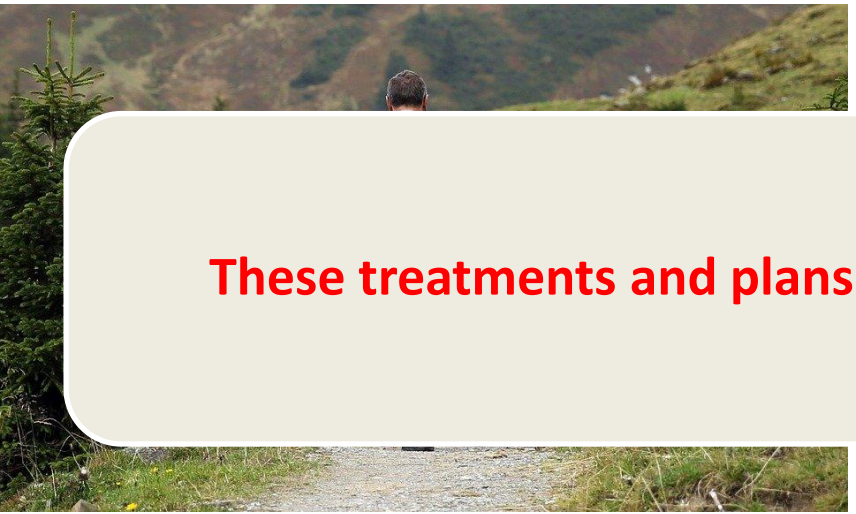
Please see other slides for the references (Skull with cigarette original painting by Vincent Van Gogh, 1886)

What are the non-drug pharmacological options for COPD?

- Offer treatment and support to **stop smoking**
- Offer **pneumococcal and influenza** vaccinations
- Offer **pulmonary rehabilitation** if indicated
- Co-develop a personalized **self management plan**
- **Optimise treatment for comorbidities**

National Institute for Health and Care Excellence. Chronic obstructive pulmonary disease in over 16s: diagnosis and management NICE guideline NG115. 2019.

What are the non-drug pharmacological options for COPD?



- Offer treatment and support to **stop smoking**
- Offer **pneumococcal and**

if

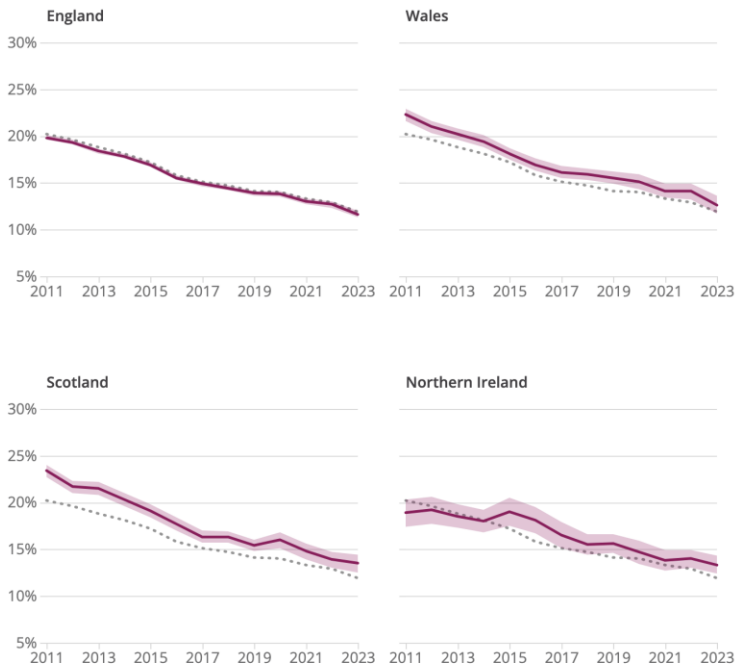
These treatments and plans should be revisited at every review

- **Optimise treatment for comorbidities**

National Institute for Health and Care Excellence. Chronic obstructive pulmonary disease in over 16s: diagnosis and management NICE guideline NG115. 2019.

Smoking Prevalence

- England was 11.6%
- Wales was 12.6%
- Scotland was 13.5%
- Northern Ireland was 13.3%
- (ONS, 2023)



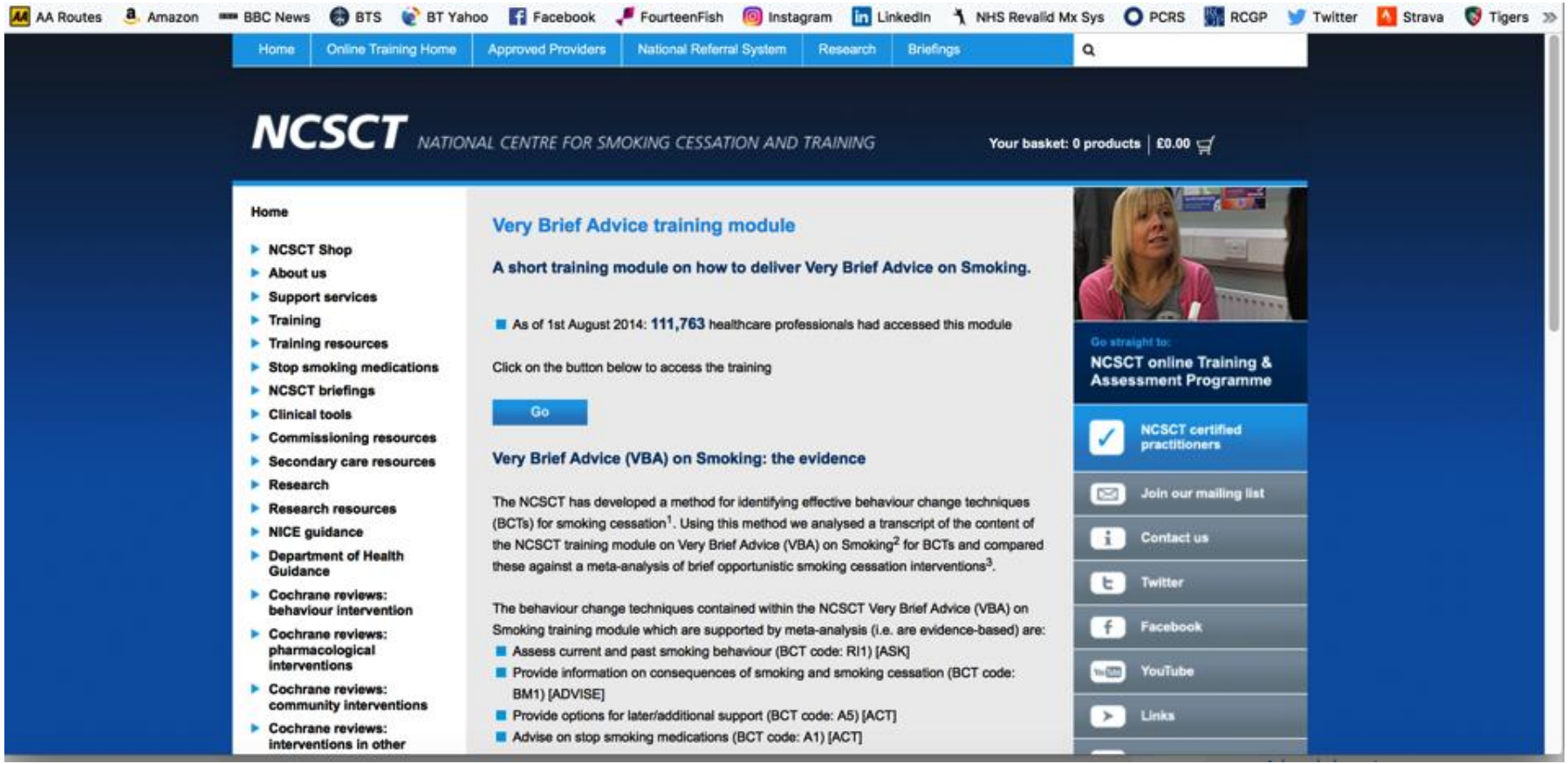
Office Of National Statistics (2023) Accessed May 2025

- The Chief Medical Officer, Professor Sir Chris Whitty has put the case very succinctly…

- “The key points about vaping (e-cigarettes) can be easily summarised. If you smoke, vaping is much safer; if you don’t smoke, don’t vape.”

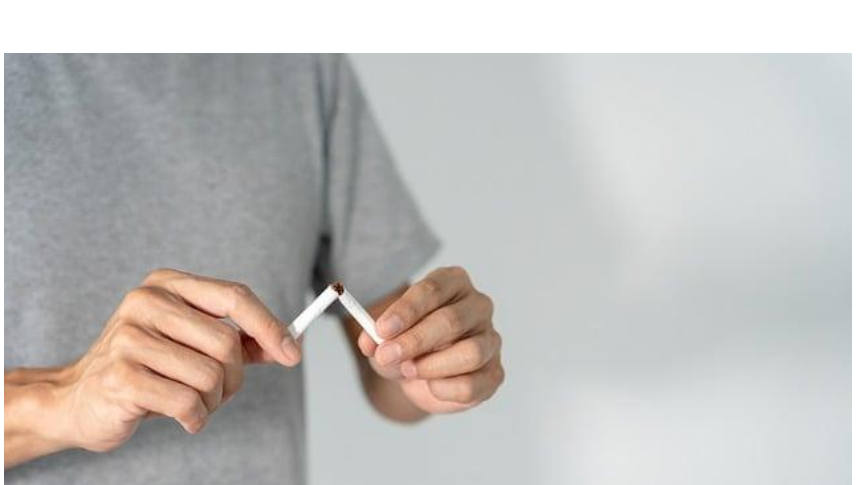
Very brief advice for smoking cessation

Very Brief Advice Training (NCSCT)



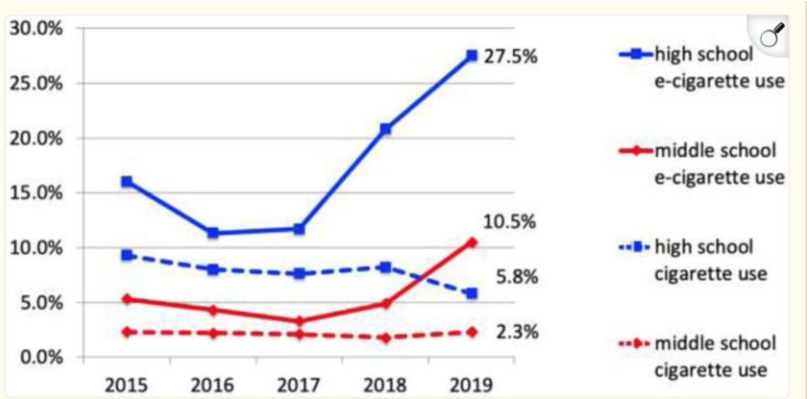
How to influence people and change lives?

- **Ask** – do you smoke?
- **Advice** – the best way to stop is with professional support and the medications available to help
- **Act (connect)** – shall I send a referral for you to have a discussion with the team



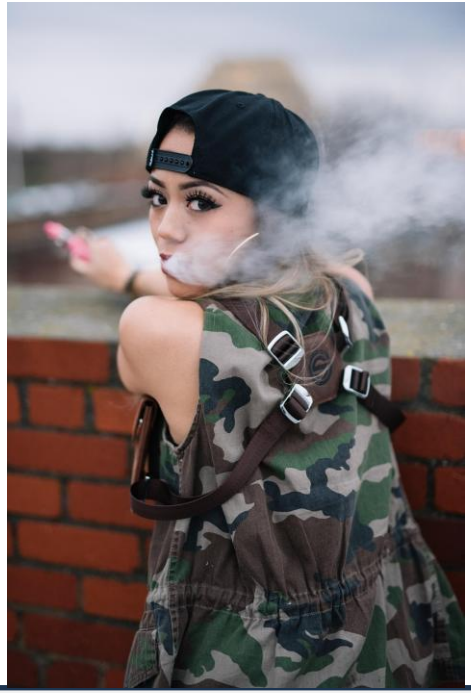
1. Vidrine JI, Shete S, Cao Y, Greisinger A, Harmonson P, Sharp B, et al. Ask-Advise-Connect: a new approach to smoking treatment delivery in health care settings. JAMA internal medicine. 2013;173(6):458–64.

Vaping prevalence in younger people



Open in a new tab

NYTS data from 2015-2019 demonstrating the dramatic increase in e-cigarette or vaping device use in high school and middle school populations, which is believed to be driven primarily by the popularity of the pod-based vape JUUL. *Centers for Disease Control and Prevention National Youth Tobacco Survey (NYTS); 2019.*



Casey AM, Muise ED, Crotty Alexander LE. Vaping and e-cigarette use. Mysterious lung manifestations and an epidemic. Curr Opin Immunol. 2020;66:143-50.

Benefits of Pulmonary Rehabilitation

Improved Exercise Capacity[1]

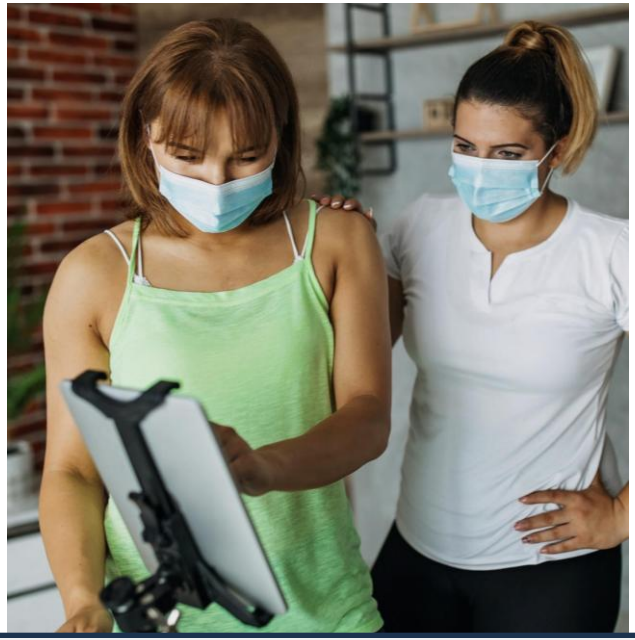
Pulmonary rehabilitation helps people with chronic respiratory conditions exercise more effectively and with less breathlessness.

Enhanced Quality of Life[2]

By promoting better symptom control and increasing daily activity, pulmonary rehabilitation improves patients' overall quality of life.

Reduced Hospital Admissions[3]

Studies show pulmonary rehabilitation significantly lowers hospital admissions and reduces healthcare usage for respiratory patients.



1. Couser Jr JL, Guthmann R, Hamadeh MA, Kane CS. Pulmonary rehabilitation improves exercise capacity in older elderly patients with COPD. Chest. 1995;107(3):730–4. 2. McCarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y. Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane database of systematic reviews. 2015. 3. Jenkins AR, Burtin C, Camp PG, Lindenauer P, Carlin B, Alison JA, et al. Do pulmonary rehabilitation programmes improve outcomes in patients with COPD posthospital discharge for exacerbation: a systematic review and meta-analysis. Thorax. 2024;79(5):438–47.

Deconditioning following admission to hospital

- Inactivity (eg resting at home) is associated with atrophy and a **loss** of muscle strength at a rate of **12% a week**[1,2]
- After 3 to 5 weeks of bed-rest, almost 50% of the muscle strength is lost.[1,2]
- Effective measures to promote physical activity available in hospital (20 trials)[3]

1. Porth C, Matfin G, Porth C. Pathophysiology : concepts of altered health states. Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2009.2. Knight J, Nigam Y, Jones A. Effects of bedrest 5: the muscles, joints and mobility. Nurs Times. 2019;115(4):54-7.3. Taylor NF, Harding KE, Dennett AM, Febrey S, Warmoth K, Hall AJ, et al. Behaviour change interventions to increase physical activity in hospitalised patients: a systematic review, meta-analysis and meta-regression. Age and Ageing. 2021;51(1).

Deconditioning Summary

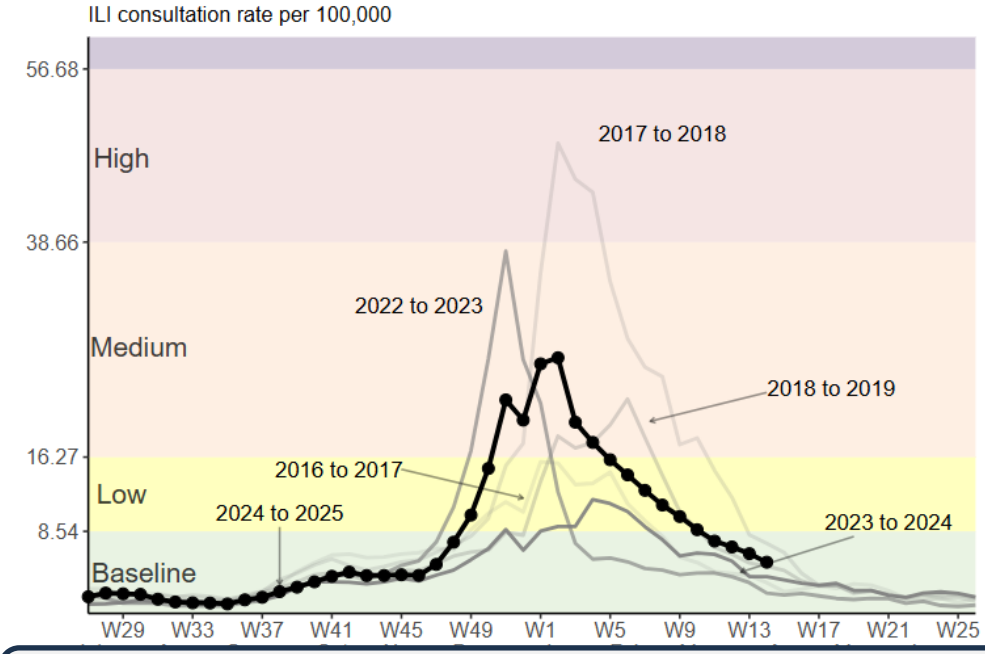
- Increases falls[1]
- Worsens mental health[2]
- Increases risk of infection[3,4]
- Worse respiratory outcomes[5,6,7]
- Worse cardiovascular outcomes[8]

- More osteoporosis[9,10]
- Muscle atrophy [9,10]
- Reduced exercise tolerance [9,10]
- Worse diabetes outcomes and obesity outcomes[11]
- Higher blood pressure[12]

1 - Sherrington C et al. Exercise for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews 2019. 2- Conn VS. Anxiety outcomes after physical activity interventions: meta-analysis findings. Nurs Res 2010;59:224-231 3-Woods J et al. The COVID-19 Pandemic and Physical Activity. Sports Medicine and Health Science 2020. 4- Silver JK. Prehabilitation could save lives in a pandemic. BMJ 2020;369:m1386 5 - Puhan MA, Gimeno-Santos E, Cates CJ, Troosters T. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews 2016. 6 - McCarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y. Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane database of systematic reviews 2015. 7 - Bolton CE, Bevan-Smith EF, Blakey JD et al. British Thoracic Society guideline on pulmonary rehabilitation in adults: accredited by NICE. Thorax 2013;68:ii1-ii30 8- Myers J, Prakash M, Froelicher V, Do D, Partington S, Atwood JE. Exercise Capacity and Mortality among Men Referred for Exercise Testing. New England Journal of Medicine. 2002;346(11):793-801. 9-Cartee GD, Hepple RT, Bamman MM, Zierath JR. Exercise Promotes Healthy Aging of Skeletal Muscle. Cell metabolism. 2016;23(6):1034-47. 10-Kell RT, Bell G, Quinney A. Musculoskeletal fitness, health outcomes and quality of life. Sports Med. 2001;31(12):863-73. 11 - Sigal RJ, Armstrong MJ, Colby P, Kenny GP, Plotnikoff RC, Reichert SM, et al. Physical Activity and Diabetes. Canadian Journal of Diabetes. 2013;37:S40-S4. 12 Fox K, Hillsdon M. Physical activity and obesity. Obesity reviews. 2007;8(Suppl. 1):115-21

Flu epidemiology

Weekly GP influenza-like illness consultation rates per 100,000 from the RCGP RSC network, England, by season



- most flu activity usually occurs between mid-November and March
- during the 2024 to 2025 season, flu circulated above baseline levels from December 2024 to early March 2025, peaking at new year
- influenza activity was higher in the 2024 to 2025 season than in the 2023 to 2024 season
- hospital flu admissions and intensive care and high-dependency unit admissions were higher than in the previous flu season
- modelling of influenza-attributable mortality in England estimated approximately 7,800 deaths due to flu in 2024 to 2025 flu season, compared to approx 3,600 in the previous season

The national flu vaccination programme 2025 to 2026 (NHS England) accessed on 3/10/2025 - https://www.gov.uk/government/publications/national-flu-immunisation-programme-plan-2025-to-2026

Why vaccinate these risk groups?

Influenza-related population mortality rates and relative risk of death among those aged 6 months to under 65 years by clinical risk group in England, September 2010 to May 2011

	Number of fatal flu cases (%)	Mortality rate per 100,000 population	Age-adjusted relative risk
In a risk group	213 (59.8)	4.0	11.3 (9.1-14.0)
Not in any risk group	143 (40.2)	0.4	Baseline
Chronic renal disease	19 (5.3)	4.8	18.5
Chronic heart disease	32 (9.0)	3.7	10.7 (7.3-15.7)
Chronic respiratory disease	59 (16.6)	2.4	7.4 (5.5-10.0)
Chronic liver disease	32 (9.0)	15.8	48.2 (32.8-70.6)
Diabetes	26 (7.3)	2.2	5.8 (3.8-8.9)
Immunosuppression	71 (19.9)	20.0	47.3 (35.5-63.1)
Chronic neurological disease (excluding stroke/transient ischaemic attack)	42 (11.8)	14.7	40.4 (28.7-56.8)
Total	378	0.8	

The national flu vaccination programme 2025 to 2026 (NHS England) accessed on 3/10/2025 - https://www.gov.uk/government/publications/national-flu-immunisation-programme-plan-2025-to-2026

Flu vaccine uptake in England (%)

Target group	2024/25	2023/24	2022/23	2021/22	2020/21	2019/20	2018/19
Patients aged 65 years and over	74.9	77.8	79.9	82.3	80.9	72.4	72
Patients aged 6 months to under 65 years in risk groups	40.0	41.4	49.1	52.9	53	44.9	48
Pregnant women in a clinical risk group*	44.9	41.4	33.2	51.8	57.7	65.9	60.2
Pregnant women not in a clinical risk group	33.6	30.1	47.8	36	41.5	42.1	43.7
All pregnant women	35.0	32.1	35.0	37.9	43.6	43.7	45.2
Frontline healthcare workers	37.8	42.8	49.9	60.5**	76.8	74.3	70.3

The national flu vaccination programme 2025 to 2026 (NHS England) accessed on 3/10/2025 - https://www.gov.uk/government/publications/national-flu-immunisation-programme-plan-2025-to-2026

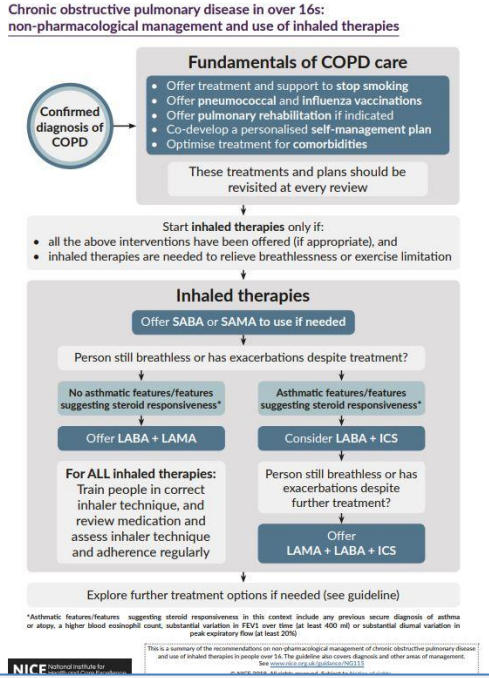
Vaccine uptake for frontline healthcare workers

- in the 2024 to 2025 season, 37.8% of frontline HCWs were vaccinated
  - 51.5% of frontline HCWs in GP practices received a vaccine
  - 37.5% of frontline HCWs in NHS trusts received a vaccine
- this is the fourth consecutive season to show a decrease in the vaccination of frontline HCWs and the lowest uptake since the 2010 to 2011 flu season
- all frontline health and social care workers should be offered a flu vaccine as part of the organisations' policy

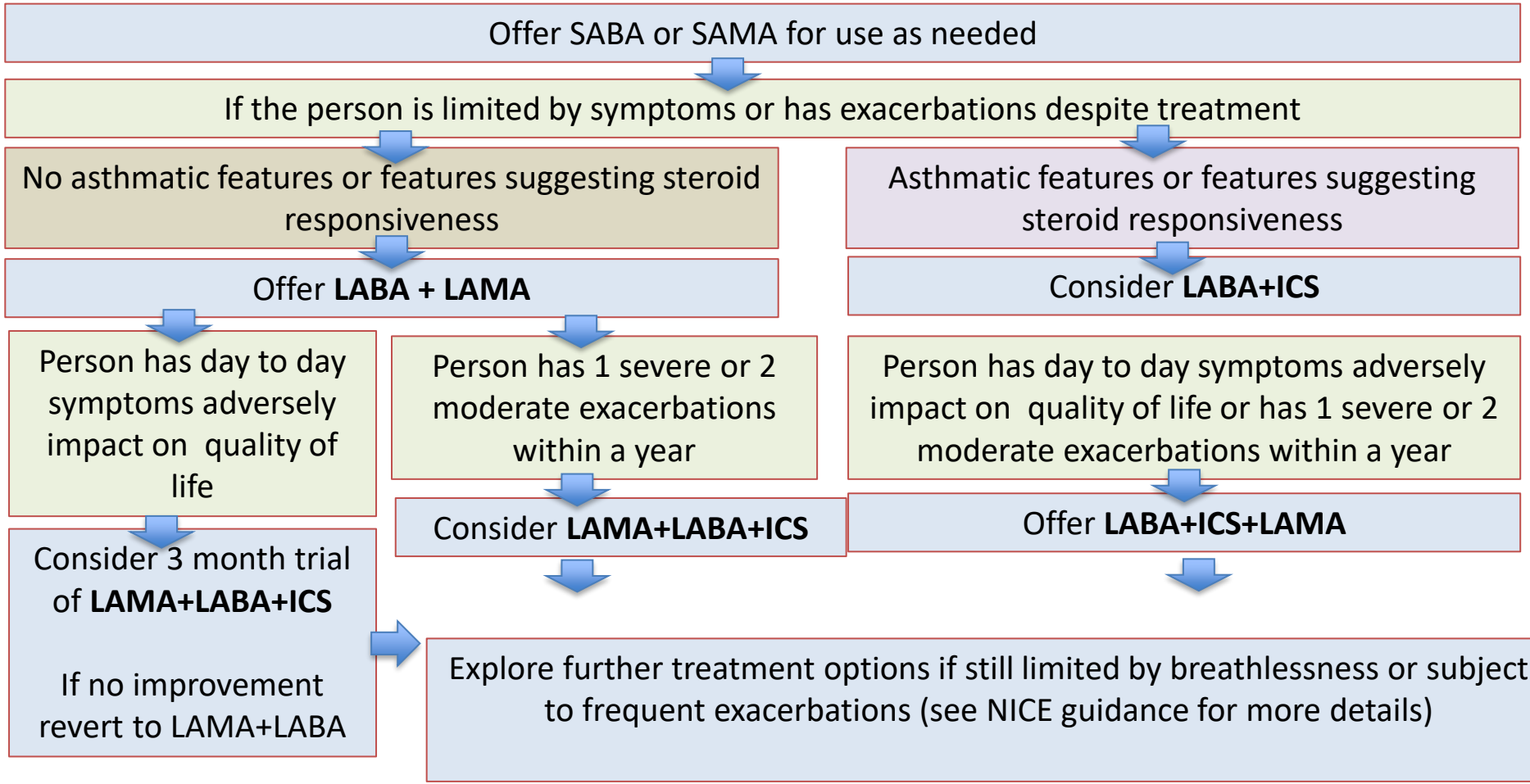
The national flu vaccination programme 2025 to 2026 (NHS England) accessed on 3/10/2025 - https://www.gov.uk/government/publications/national-flu-immunisation-programme-plan-2025-to-2026

NICE – asthmatic features or features suggesting steroid responsiveness

- any previous secure diagnosis of asthma or atopy
- higher blood eosinophil count
- substantial variation in FEV1 (400mls)
- substantial variation in PEFR (20%)

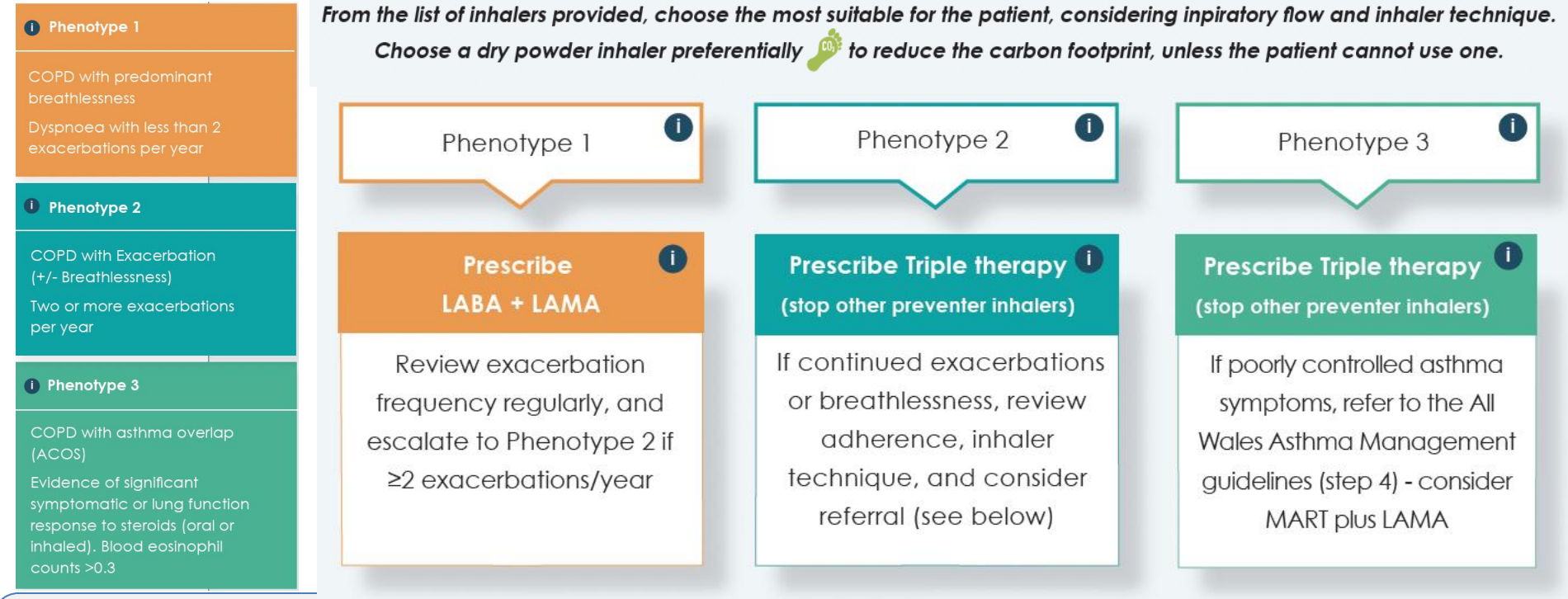


National Institute for Health and Care Excellence. Chronic obstructive pulmonary disease in over 16s: diagnosis and management NICE guideline NG115. 2019.



National Institute for Health and Care Excellence. Chronic obstructive pulmonary disease in over 16s: diagnosis and management NICE guideline NG115. 2019.

NHS Wales Formulary adopted by many areas



NHS Wales. All Wales COPD management and prescribing guideline 2025 (available from https://awttc.nhs.wales/medicines-optimisation-and-safety/medicines-optimisation-guidance-resources-and-data/prescribing-guidance/all-wales-copd-management-and-prescribing-guideline/)

How many exacerbations does the average person with COPD have every year?

- In major trials of people under specialist care the figure is between 0.85 – 1.3[1,2,3]

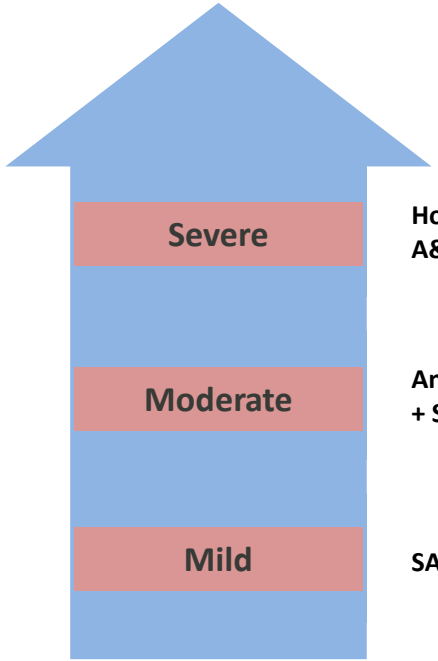
Table 1

Comparison of 9 studies of exacerbations over 30 years

Author/Year	Country	N	Years	Patient type	Exac. freq	Follow up
Monto43	USA	142	1	COPD and NOCB[a]	2.33	Telephone weekly
Fletcher17	England	792	8	Unselected[b]	2.34	6 monthly
Kanner44	USA	84	4	Mixed[c]	0.34	Telephone Weekly
Anthonisen45	Canada	173	3.5	COPD	1.30	3 monthly
Seemungal48	UK	70	1.0	COPD	3.00	Diary cards
Seemungal46	UK	101	2.5	COPD	2.50	Diary cards
TORCH104	World wide	6112	3	COPD	1.13[χ]	3 monthly
INSPIRE51	Europe	1323	2	COPD	1.30[δ]	Diary cards
UPLIFT136	World wide	5993	4	COPD	0.85[χ]	3 monthly

1- Calverley P, Anderson J, Celli B, Ferguson G, Jenkins C, Jones P, et al. Salmeterol and fluticasone proprionate and survival in chronic obstructive pulmonary disease. N Engl J Med. 2007;356:775 - 89. 2- Tashkin DP, Celli B, Senn S, Burkhart D, Kesten S, Menjoge S, et al. A 4-Year Trial of Tiotropium in Chronic Obstructive Pulmonary Disease. N Engl J Med. 2008;359(15):1543-54 3. Seemungal TAR, Hurst JR, Wedzicha JA. Exacerbation rate, health status and mortality in COPD--a review of potential interventions. International journal of chronic obstructive pulmonary disease. 2009;4:203-23.

Definition: Exacerbations are an acute worsening of respiratory symptoms, resulting in additional therapy[1]



Hospitalisation or A&E visit

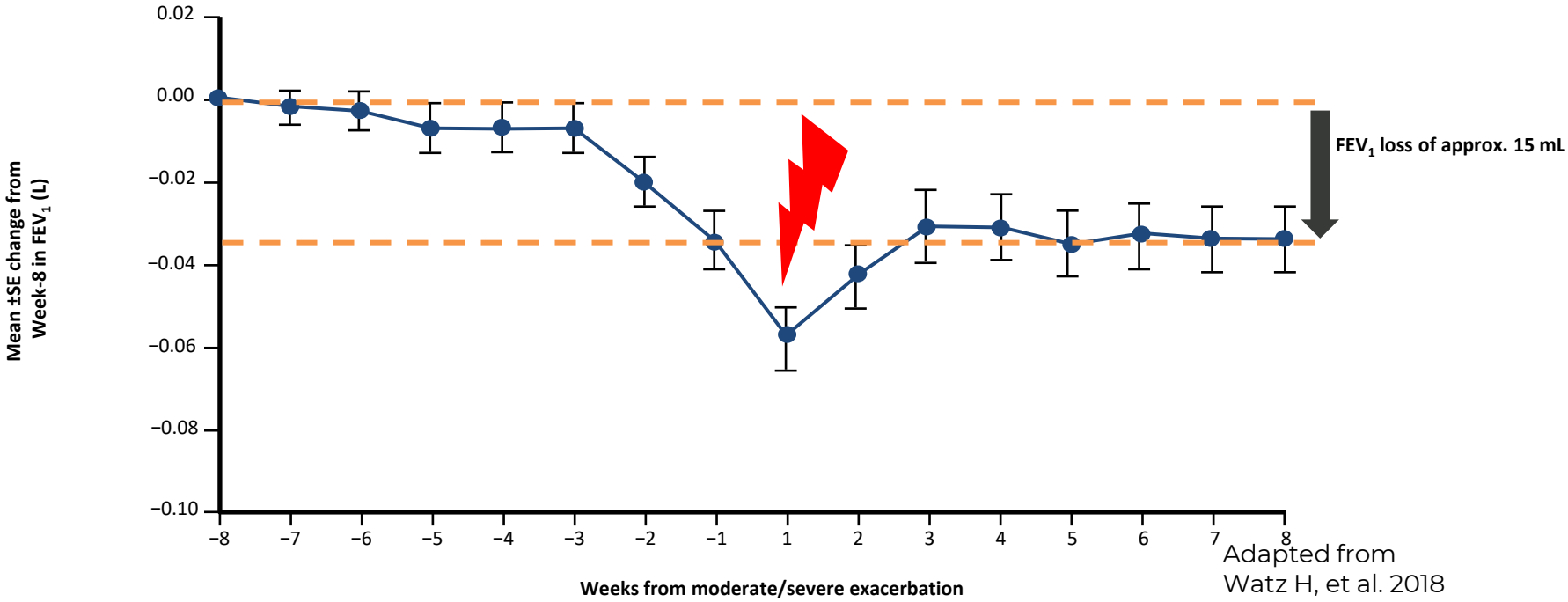
Antibiotics and/or OCS + SABA or SAMA

SABA or SAMA only

Up to 77% of patients will have at least one moderate-to-severe exacerbation within a 3-year period[2]

1. GOLD. Global strategy for the diagnosis, management, and prevention of COPD: 2021 report. Available from: https://goldcopd.org (Accessed November 2021); 2. Hurst JR, et al. N Engl J Med 2010;363:1128–1138;.

Lung function lost with exacerbations



Adapted from
Watz H, et al. 2018

Watz H, Tetzlaff K, Magnussen H, Mueller A, Rodriguez-Roisin R, Wouters EFM, et al. Spirometric changes during exacerbations of COPD: a post hoc analysis of the WISDOM trial. RESPIRATORY RESEARCH. 2018;19(1):251.

Lung function decline following a severe exacerbation is worse in those with milder disease

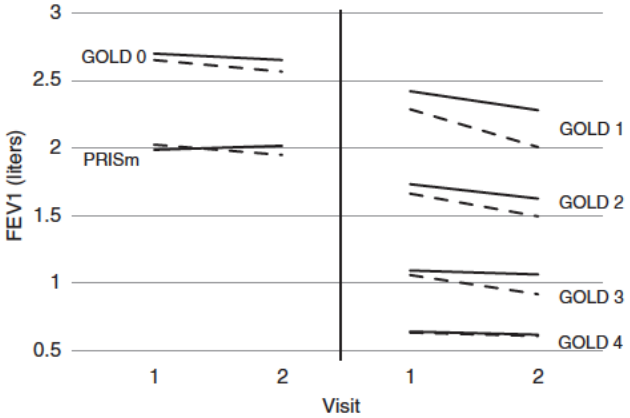


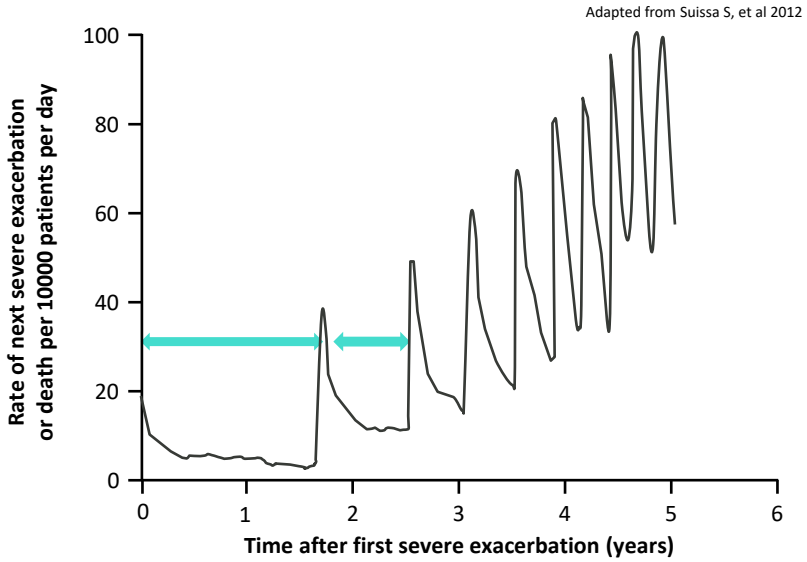
Figure 1. Estimated FEV_1 changes by Global Initiative for Chronic Obstructive Lung Disease (GOLD) group and severe exacerbations status. Estimates were obtained from linear mixed model fits (*see* STATISTICAL ANALYSES section) for the completer and late subjects. The plot demonstrates that those with at least one severe exacerbation (*dashed lines*) had faster declines in FEV_1, on average, compared with those that did not (*solid lines*), for each GOLD group. PRISm = preserved ratio impaired spirometry.

mild – 87ml
moderate – 20ml
severe- 20ml
very severe – 7ml

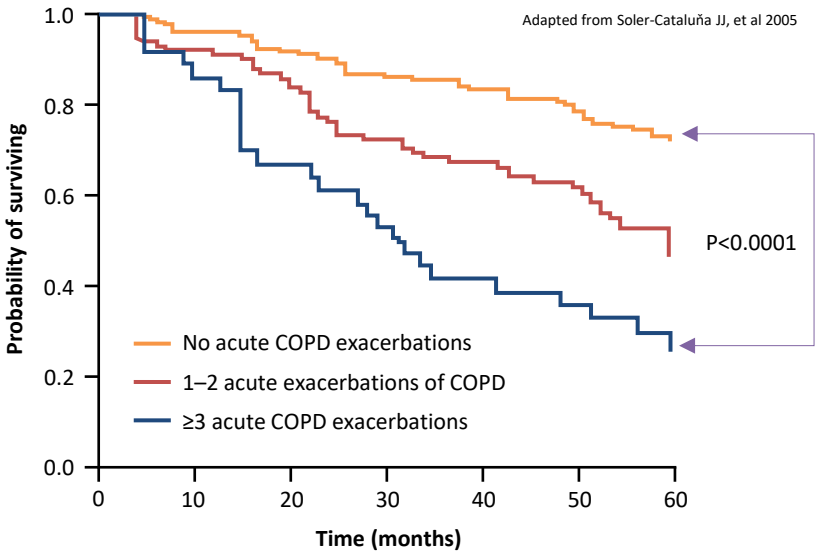
Dransfield MT, Kunisaki KM, Strand MJ, Anzueto A, Bhatt SP, Bowler RP, et al. Acute Exacerbations and Lung Function Loss in Smokers with and without Chronic Obstructive Pulmonary Disease. American journal of respiratory and critical care medicine. 2017;195(3):324-30.

Preventing the first exacerbation could reduce the risk of mortality

Time between exacerbations reduces*



More exacerbations increases risk of mortality[2]



1. Suissa S, Dell'Aniello S, Ernst P. Long-term natural history of chronic obstructive pulmonary disease: severe exacerbations and mortality. Thorax. 2012;67(11):957-63. 2. Soler-Cataluña JJ, Martínez-García MA, Román PSánchez, Salcedo E, Navarro M, Ochando R. Severe acute exacerbations and mortality in patients with chronic obstructive pulmonary disease. Thorax. 2005;60.

How soon after worsening of symptoms starts before a patient should commence steroids / antibiotics?

- Start SABA early on
- Start OCS or antibiotics usually 48-72 hours or longer

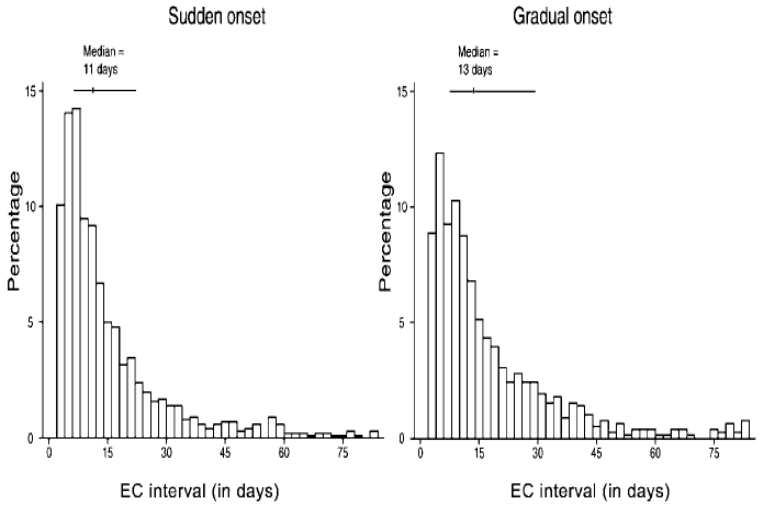


Figure 3 Histograms of exacerbation recovery (EC) intervals grouped by whether the onset of symptoms was sudden (OE=0) or gradual (OE ≥1). OE, number of days between an opening event and the first day of the exacerbation event.

Aaron SD, Donaldson GC, Whitmore GA, Hurst JR, Ramsay T, Wedzicha JA. Time course and pattern of COPD exacerbation onset. Thorax. 2012;67(3):238-43.

How long does an exacerbation last

Usually last 11 – 13 days (median) and quicker onset settle faster – though many last considerably longer before full symptom resolution

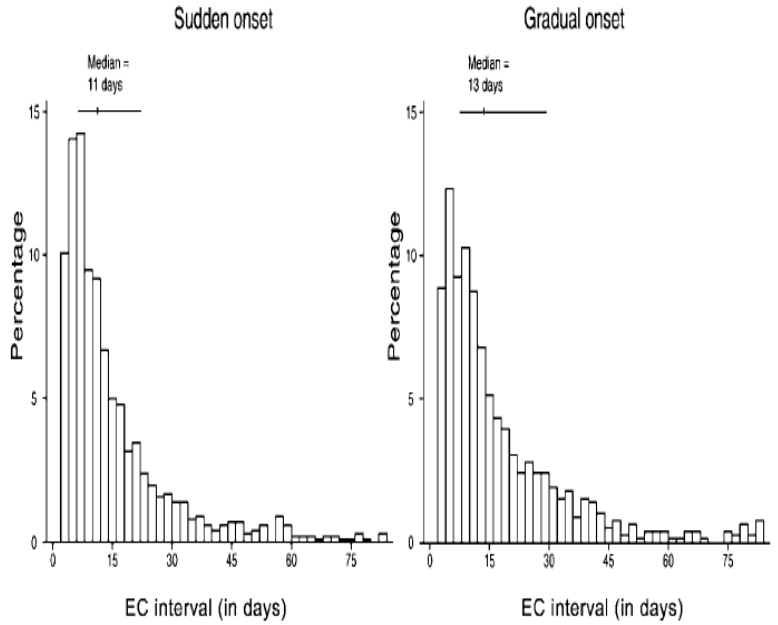


Figure 3 Histograms of exacerbation recovery (EC) intervals grouped by whether the onset of symptoms was sudden (OE=0) or gradual (OE ≥1). OE, number of days between an opening event and the first day of the exacerbation event.

Aaron SD, Donaldson GC, Whitmore GA, Hurst JR, Ramsay T, Wedzicha JA. Time course and pattern of COPD exacerbation onset. Thorax. 2012;67(3):238-43.

What dose of steroid and antibiotic and for how long?

- Prednisolone 30mg daily for 5 days. [1,2,3]
- Antibiotic for 5 days[3,4]
  - Amoxicillin, Doxycycline, Clarithromycin

1 - National Institute for Clinical Excellence. NG 115 Chronic obstructive pulmonary disease in over 16s: diagnosis and management. NICE; 2019. 2- Walters JA, Tan DJ, White CJ, Wood-Baker R. Different durations of corticosteroid therapy for exacerbations of chronic obstructive pulmonary disease. Cochrane Database Syst Rev. 2018;3:Cd006897. 3- Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global Strategy for the Diagnosis, Management and Prevention of COPD (2020). 2019. 4- National Institute for Clinical Excellence. Chronic obstructive pulmonary disease (acute exacerbation): antimicrobial prescribing. London NICE; 2018 Dec 2018.

I just need another course of antibiotics and steroids – I'm not quite better yet.

Clinical review important[1]

- Pneumonia
- Pulmonary embolus
- Carcinoma of lung
- Bronchiectasis
- Pleural effusion
- Heart failure
- Atrial fibrillation

- Remember normal recovery[2]
- No benefit from longer course of antibiotics (for infection)[3]
- No benefit from longer course of steroids (for exacerbations) in hospital inpatients (no studies in primary care)[4,5]

Cotton MM, Bucknall CE, Dagg KD, Johnson MK, MacGregor G, Stewart C, et al. Early discharge for patients with exacerbations of chronic obstructive pulmonary disease: a randomised controlled trial. Thorax. 2000;55(11):902-6. 2 - Aaron SD, Donaldson GC, Whitmore GA, Hurst JR, Ramsay T, Wedzicha JA. Time course and pattern of COPD exacerbation onset. Thorax. 2012;67(3):238-43.3 - National Institute for Clinical Excellence. CG91: Pneumonia in adults: diagnosis and management 2014. 4- Sivapalan P, Ingebrigtsen TS, Rasmussen DB, Sørensen R, Rasmussen CM, Jensen CB, et al. COPD exacerbations: the impact of long versus short courses of oral corticosteroids on mortality and pneumonia: nationwide data on 67 000 patients with COPD followed for 12 months. BMJ Open Respiratory Research. 2019;6(1):e000407. 5 - Walters JA, Tan DJ, White CJ, Wood-Baker R. Different durations of corticosteroid therapy for exacerbations of chronic obstructive pulmonary disease. Cochrane Database Syst Rev. 2018;3:Cd006897.

Anti-Inflammatory Maintenance Therapy

Figure A3.3

Inhaled Corticosteroids	• Regular treatment with ICS increases the risk of pneumonia especially in those with severe disease **(Evidence A)** • An ICS combined with a LABA is more effective than the individual components in improving lung function and health status and reducing exacerbations in patients with exacerbations and moderate to very severe COPD **(Evidence A)** • We do not encourage the use of a LABA+ICS combination in COPD. If there is an indication for an ICS the combination LABA+LAMA+ICS has been shown to be superior to LABA+ICS and is therefore the preferred choice • Triple inhaled therapy of LABA+LAMA+ICS improves lung function, symptoms and health status, and reduces exacerbations, compared to LABA+ICS, LABA+LAMA or LAMA monotherapy **(Evidence A)**. Recent data suggesta beneficial effect of triple inhaled therapy versus fixed-dose LABA+LAMA combinations on mortality in symptomatic COPD patients with a history of frequent and/or severe exacerbations • If patients with COPD have features of asthma, treatment should always contain an ICS • Independent of ICS use, there is evidence that a blood eosinophil count < 2% increases the risk of pneumonia **(Evidence C)** • Combinations can be given as single or multiple inhaler therapy. Single inhaler therapy may be more convenient and effective than multiple inhalers
Oral Glucocorticoids	• Long-term use of oral glucocorticoids has numerous side effects **(Evidence A)** with no evidence of benefits **(Evidence C)**
PDE Inhibitors	• In patients with chronic bronchitis, severe to very severe COPD and a history of exacerbations: ▪ Roflumilast improves lung function and reduces moderate and severe exacerbations **(Evidence A)** • Ensifentrine improves lung function **(Evidence A)** but an effect on exacerbations has not been evaluated in patients at increased exacerbation risk
Antibiotics	• Long-term azithromycin and erythromycin therapy reduces exacerbations over one year **(Evidence A)** • Preferentially, but not only in former smokers with exacerbations despite appropriate therapy, azithromycin can be considered (**Evidence B**) • Treatment with azithromycin is associated with an increased incidence of bacterial resistance **(Evidence A)** and hearing test impairments **(Evidence B)**
Mucoregulators & Antioxidant Agents	• Regular treatment with mucolytics such as erdosteine, carbocysteine and N-acetylcysteine reduces the risk of exacerbations in select populations **(Evidence B)** • Antioxidant mucolytics are recommended only in selected patients **(Evidence A)**

Biologics	• In patients with moderate to severe COPD with a history of exacerbations despite triple therapy and higher blood eosinophils (≥ 300 cells/μL):
	  ▪ Dupilumab reduces exacerbations, improves lung function and quality of life in patients with chronic bronchitis **(Evidence A)**
	  ▪ Mepolizumab reduces exacerbations in patients with and without chronic bronchitis **(Evidence A)**

Other Anti-Inflammatory Agents	• Statin therapy is not recommended for prevention of exacerbations (**Evidence A**) • Simvastatin does not prevent exacerbations in COPD patients at increased risk of exacerbations and without indications for statin therapy **(Evidence A)**. However, observational studies suggest that statins may have positive effects on some outcomes in patients with COPD who receive them for cardiovascular and metabolic indications **(Evidence C)** • Leukotriene modifiers have not been tested adequately in COPD patients

Evidence Supporting Use of Biologics in the Treatment of COPD

Figure 3.11

Molecule/RCT*	Key inclusion criteria[a]	Annualized rate of moderate/severe exacerbations	Lung function improvement (pre-BD FEV1)[d]	Quality of life improvement (SGRQ)
Dupilumab (300 mg/2 weeks)				
BOREAS[1] (n=939)	FEV1 post-BD 30-70% chronic bronchitis[b] eos ≥ 300 (screen)	RR 0.70; P < 0.001	83mL; P < 0.001 (95% CI: 42, 125)	-3.4; P = 0.002 (95% CI: -5.5, -1.3)
NOTUS[2] (n=935)	FEV1 post-BD 30-70% chronic bronchitis[b] eos ≥ 300 (screen)	RR 0.66; P < 0.001	62mL; P = 0.02 (95% CI: 11, 113)	-3.4[e] (95% CI: -5.8, -0.9)
Mepolizumab (100 mg/4 weeks)				
METREO[3] (n=674)	FEV1 post-BD 20-80% eos ≥ 150 (screen) or eos ≥ 300 (previous year)	RR 0.80; NS	19mL; NS (95% CI: -29, 67)	-1.8; NS (95% CI: -4.5, 0.8)
METREX[3] (n=836)	FEV1 post-BD 20-80% eos ≥ 150 (screen) or eos ≥ 300 (previous year)[c]	RR 0.82; P = 0.04	-10mL; NS (95% CI: -54, 33)	0.2; NS (95% CI: -2.8, 3.2)
MATINEE[4] (n=804)	FEV1 post-BD 20-80% eos ≥ 300 (screen) and eos ≥ 150 (previous year)	RR 0.79; P = 0.01	-9.0mL; NS (95% CI: -60.1, 42.1)	-2.3; NS (95% CI: -4.6, 0.1)

*Molecules are listed in order of approval in the US.

These results cannot be directly compared across trials as there were different patient populations included.

a: all studies recruited patients with exacerbations in the previous year while receiving inhaled triple therapy
b: patient-reported history of chronic bronchitis (chronic productive cough) for 3 months in the year up to screening, absent other known causes
c: pre-defined eosinophilic population
d: at 52 weeks
e: significance not tested according to hierarchical testing procedure

NS: not statistically significant; eos: blood eosinophils (cells/μL); SGRQ: St George's Respiratory Questionnaire; BD: bronchodilator; RR: risk ratio.

References: [1]Bhatt et al. N Engl J Med 2023;389:205-214; [2]Bhatt et al. N Engl J Med 2024;390:2274-2283; [3]Pavord et al. N Engl J Med 2017;377:1613-1629; [4]Sciurba et al. N Engl J Med 2025;392:1710-1720; .

NICE recommendation March 2026

1.1 Dupilumab can be used as an add-on maintenance treatment option for uncontrolled chronic obstructive pulmonary disease (COPD) with raised blood eosinophils in adults if:

- they are having:
  - triple therapy including an inhaled corticosteroid, a long-acting beta2-agonist (LABA) and a long-acting muscarinic antagonist (LAMA), or
  - double therapy including a LABA and a LAMA if inhaled corticosteroids are not appropriate, and
- the company provides dupilumab according to the commercial arrangement.

Uncontrolled COPD is defined as 1 or more severe exacerbations or 2 or more moderate exacerbations in the previous 12 months. Raised blood eosinophils is defined as having a blood eosinophil count of 0.3 x 10^9 cells per litre or more (300 cells per microlitre or more).

1.2 Assess response to dupilumab at 12 months. Stop dupilumab if, compared with the 12 months before starting it, the number of severe exacerbations:

- is higher, or
- is the same, and the number of moderate exacerbations is higher.

National Institute for Clinical Excellence. Dupilumab for maintenance treatment of uncontrolled chronic obstructive pulmonary disease with raised blood eosinophils 2026 26 March 2026.

Practical management of frequent exacerbator (or use of steroid / antibiotics)

1. Is the condition really an exacerbation?
2. Is the person being treated twice for a condition that needs a short course treatment?
3. Inhaler technique / compliance
4. Is it really COPD or something else? Should I consider CXR if recurrence (or HRCT for bronchiectasis) or sputum culture next exacerbation?
5. Should I refer to specialist for consideration of biologic or azithromycin or LVRS or further investigation?

SH personal pathway (based on evidence above)

Müllerová H, Lu C, Li H, Tabberer M. Prevalence and burden of breathlessness in patients with chronic obstructive pulmonary disease managed in primary care. PLoS One. 2014;9(1):e85540.

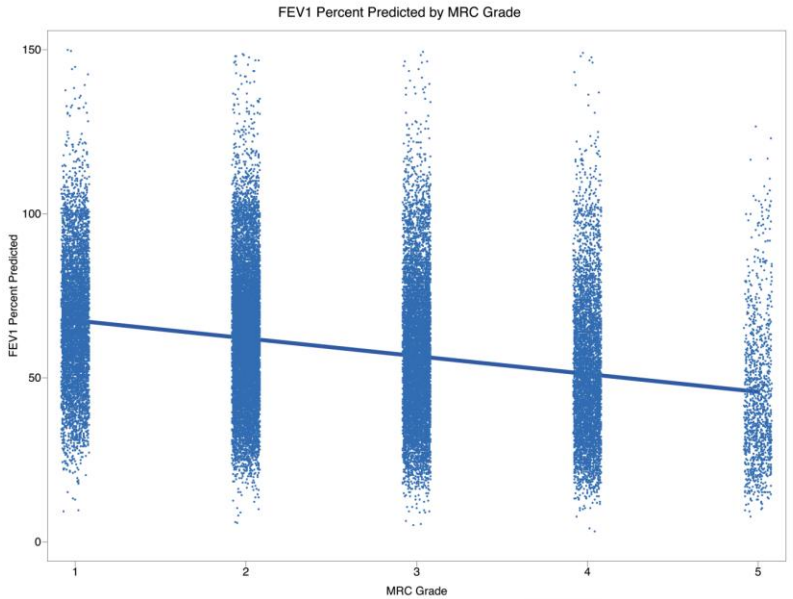
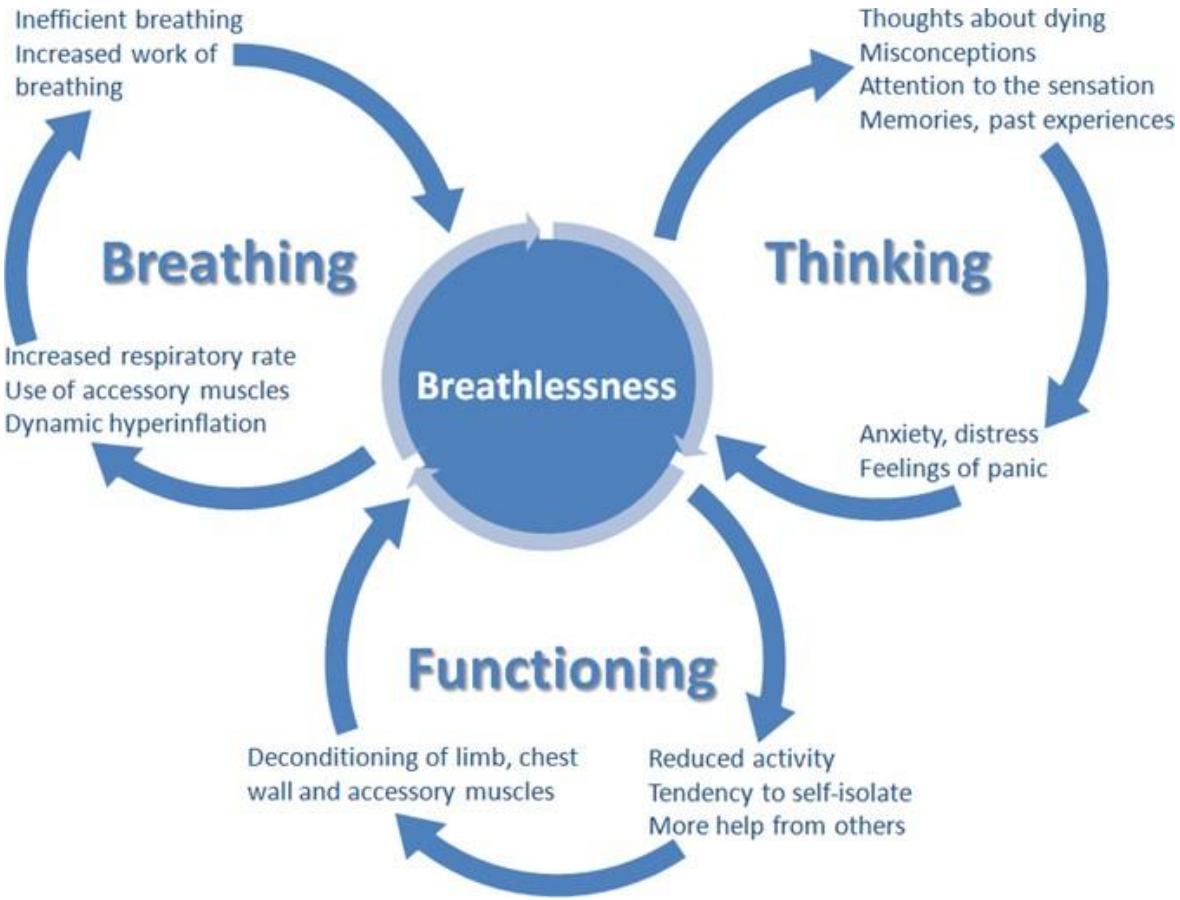


Figure 4. Bivariate relationship between $FEV_{1\%}$ predicted and MRC grade: scatter plot. Abbreviations: $FEV_{1\%}$predicted, forced expiratory volume in one second; Stage I: FEV_1≥80% predicted; Stage II: ≥50% to <80% FEV_1 predicte Screenshot <50% FEV_1 predicted; Stage IV: >30% FEV_1 predicted; MRC, Medical Research Council. MRC scoring 1–5 equals to mMRC gr being equal to mMRC 0.
doi:10.1371/journal.pone.0085540.g004



1. Spathis A, Booth S, Moffat C, Hurst R, Ryan R, Chin C, et al. The Breathing, Thinking, Functioning clinical model: a proposal to facilitate evidence-based breathlessness management in chronic respiratory disease. npj Primary Care Respiratory Medicine. 2017;27(1):27.

Question 5: Should opioids be used to reduce symptoms in people with serious respiratory illness?

- Recommendation We suggest not using opioids for the treatment of breathlessness in people with serious respiratory illness (conditional recommendation against the intervention, very low certainty of evidence).
- Summary of evidence We considered studies of any opioid drug, given by intravenous, subcutaneous or oral routes in any dose, for the treatment of breathlessness or cough. The effects of opioids were considered separately for 1) opioids self-administered regularly at home for four or more consecutive days with outcomes ideally measured in daily life (e.g. breathlessness "now") at a singular (either morning or evening, combined averages of morning and evening, or an unspecified time) or multiple time points (both morning and evening separately) [89–99], and 2) opioids administered as one or more doses in the laboratory setting

Thank you any questions?

ASTHMA - After the diagnosis – better management?

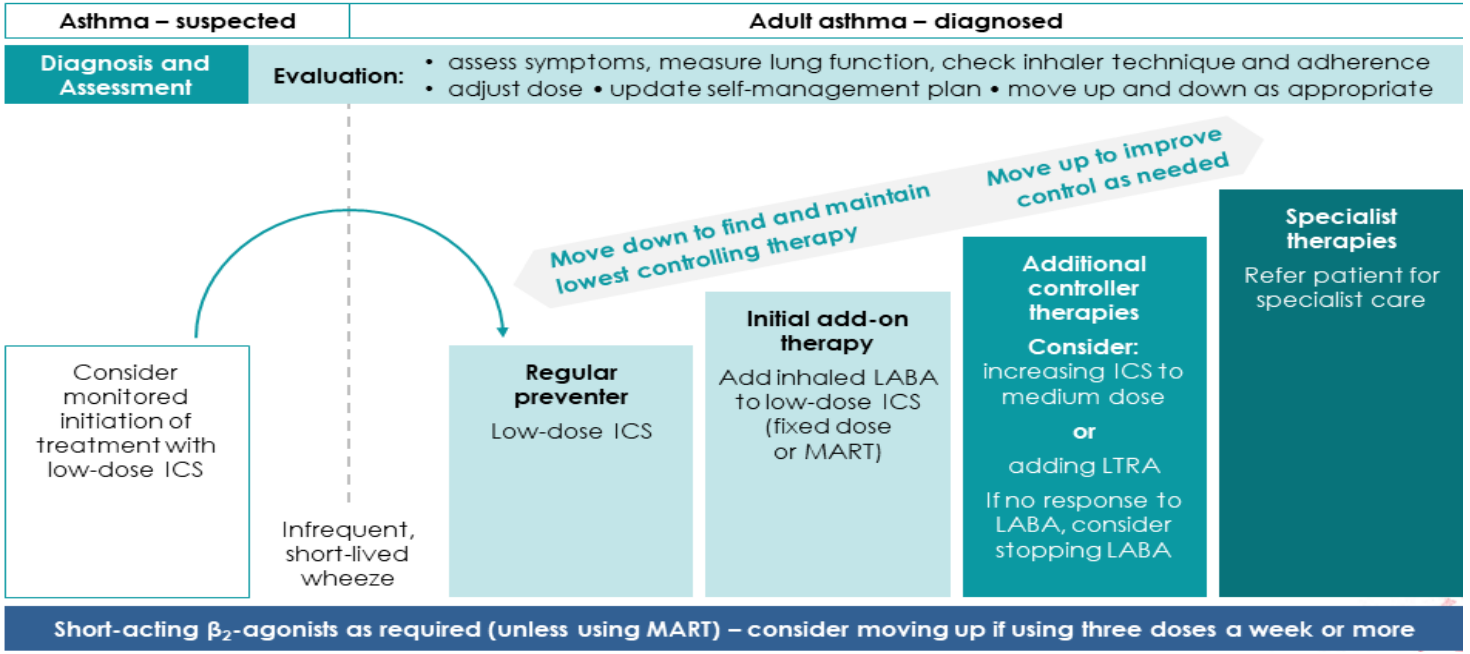
The Old Days (1999 – 2019)

Pharmacological management strategies: adults

Good practice point:

Before initiating a new drug therapy practitioners should:

- Check adherence with existing therapies
- Check inhaler technique
- Eliminate trigger factors



Adapted from BTS/SIGN 158 British Guideline on the Management of Asthma 2019 https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/ [last accessed 25th Jan 2023];

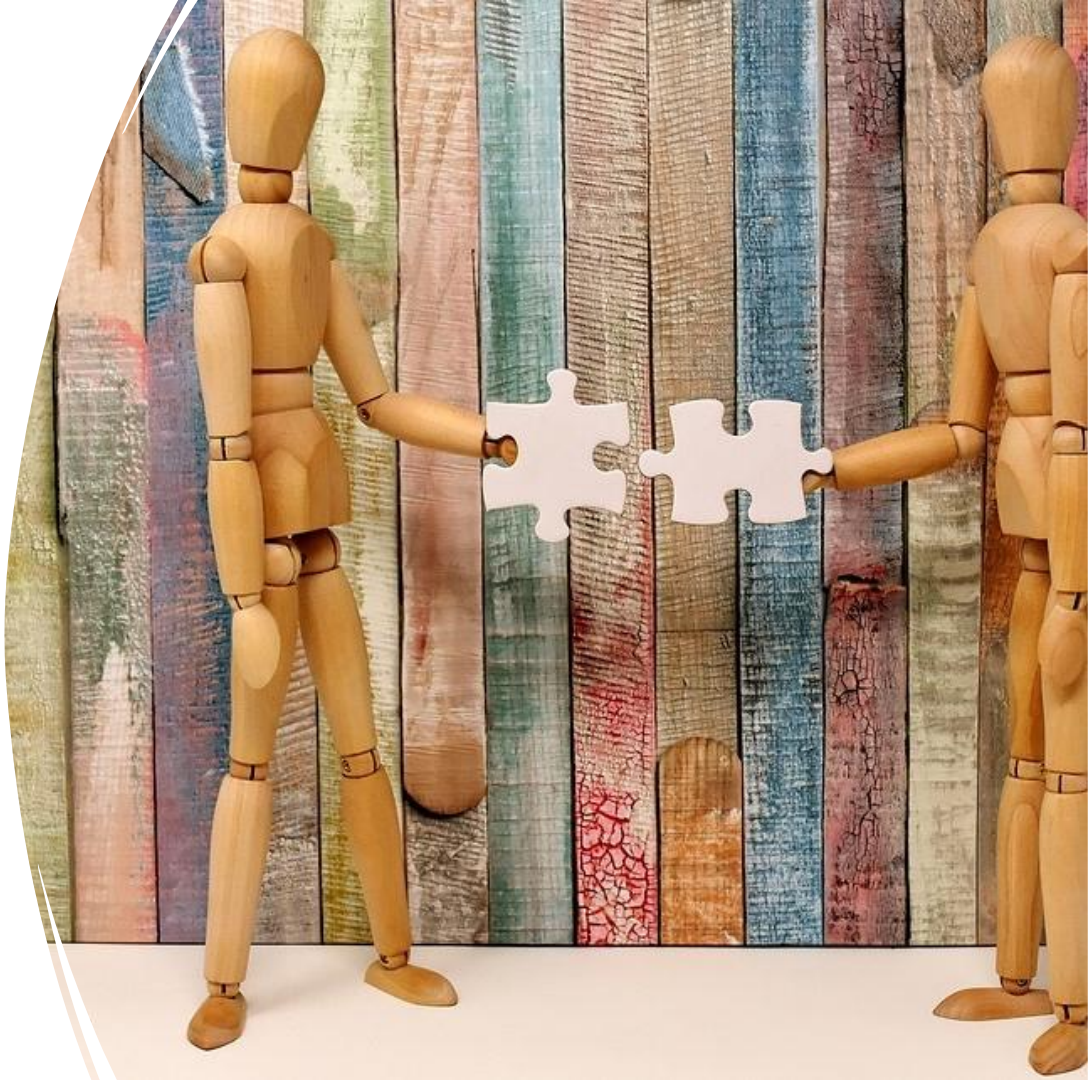
How many people?

- Have a mobile phone that can only take telephone calls?
- Have a black and white TV?
- Use of typewriter
- Have no power assisted steering in their car

Do you want a more modern alternative – fancy an upgrade?

Asthma Management

- Treatment options – established and new
- Severe Asthma and Biologics – who should we be thinking about



Why should we stop treating with SABA alone?

- Inhaled SABA has been first-line treatment for asthma for 50 years
  - Asthma was thought to be a disease of bronchoconstriction
  - Role of SABA reinforced by rapid relief of symptoms and low cost
- Regular use of SABA, even for 1–2 weeks, is associated with increased AHR, reduced bronchodilator effect, increased allergic response, increased eosinophils *(e.g. Hancox, 2000; Aldridge, 2000)*
  - Can lead to a vicious cycle encouraging overuse
  - Over-use of SABA associated with ↑ exacerbations and ↑ mortality *(e.g. Suissa 1994, Nwaru 2020)*
- Starting treatment with SABA trains the patient to regard it as their primary asthma treatment
- The only previous option was daily ICS even when no symptoms, but adherence is extremely poor
- **GINA changed its recommendation in 2019 once evidence for a safe and effective alternative was available**

EDITORIAL
GINA 2019

GINA 2019: a fundamental change in asthma management

Treatment of asthma with short-acting bronchodilators alone is no longer recommended for adults and adolescents

Helen K. Reddel[1], J. Mark FitzGerald[2], Eric D. Bateman[3], Leonard B. Bacharier[4], Allan Becker[5], Guy Brusselle[6], Roland Buhl[7], Alvaro A. Cruz[8], Louise Fleming[9], Hiromasa Inoue[10], Fanny Wai-san Ko[11], Jerry A. Krishnan[12], Mark L. Levy[13], Jiangtao Lin[14], Søren E. Pedersen[15], Aziz Sheikh[16], Arzu Yorgancioglu[17] and Louis-Philippe Boulet[18]

Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention (2022). 2022 available at www.ginaasthma.org

Questions in Mild Asthma: An Official American Thoracic Society Research Statement.

Mild asthma is asthma that is characterized by minimal symptoms and risk in patients *on SABA alone, as-needed ICS with SABA, as-needed ICS–formoterol, or daily ICS plus SABA or those who are not on any therapy*. On the basis of the survey results, our expert panel members suggested the following parameters for defining impairment and risk in patients with confirmed diagnoses on such treatment:

Daytime symptoms fewer than two per week *(impairment domain)*

Night time symptoms fewer than one per month *(impairment domain) (but many members believed that any night waking represented poor control)*

Fewer than one exacerbation per year *(risk domain) (but many members strongly believed any exacerbations during the year to represent more severe illness)*

Preserved lung function *(e.g., postbronchodilator FEV_1 greater than the lower limit of normal) (risk domain)*

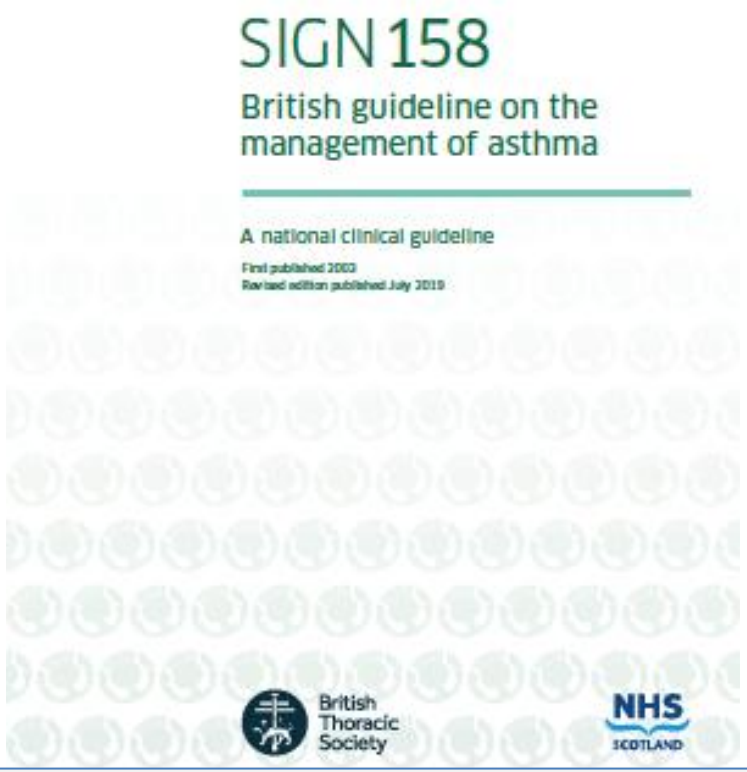
1 - Mohan A, Lugogo NL, Hanania NA, Reddel HK, Akuthota P, O'Byrne PM, et al. Questions in Mild Asthma: An Official American Thoracic Society Research Statement. Am J Respir Crit Care Med. 2023;207(11):e77-e96.

Asthma treatment levels (adults)

- Mild – low dose ICS / LABA (AIR)
- Highly symptomatic or severe exacerbation– low dose ICS / LABA (MART)
- Moderate dose ICS / LABA (MART)

Maintenance And Reliever Therapy (MART)

- "Consider the option of combined maintenance and reliever therapy in adult patients who have a history of asthma attacks on medium dose ICS or ICS/LABA." (Grade A recommendation)



British Thoracic Society, Scottish Intercollegiate Guideline Network. SIGN 158 British Guidelines for the Management of Asthma. Guideline. 2019.

MART and AIR – THE BASICS

- Not all combinations are licenced for AIR and for MART
- “Licensed indications for asthma inhalers vary between different medicines, different doses and different devices. Not all asthma inhalers are licensed for use in line with the recommendations in this guideline. See NICE's information on prescribing medicines or SIGN's information on prescribing licensed medicines out with their marketing authorisation and refer to the summary of product characteristics for individual products. ”

- Who keeps to licenced indications with salbutamol inhaler?

British Thoracic Society, National Institute for Clinical Excellence, Scottish Intercollegiate Guideline Network. NG245 Asthma: diagnosis, monitoring and chronic asthma management (BTS, NICE, SIGN). 2024.

Algorithm C: Pharmacological management of asthma in people aged 12 years and over

BTS, NICE and SIGN guideline on asthma

Take into account and try to address the possible reasons for uncontrolled asthma before starting or adjusting medicines for asthma. For example: alternative diagnoses or comorbidities; suboptimal adherence; suboptimal inhaler technique; active or passive smoking (including e-cigarettes); psychosocial factors; seasonal factors; environmental factors (such as air pollution and indoor mould exposure)

Symptom relief

MART

Maintenance therapy

When changing from low- or moderate-dose ICS (or ICS/LABA combination inhaler) plus supplementary therapy to MART, consider whether to stop or continue the supplementary therapy based on the degree of benefit achieved when first introduced

Existing diagnosis of asthma on the treatment pathway recommended by previous NICE and BTS/SIGN guidelines

SABA only → Offer low-dose ICS/formoterol combination inhaler to be taken as needed (AIR therapy)

With a SABA: If asthma is uncontrolled on low-dose ICS; low-dose ICS/LABA; low-dose ICS plus LTRA; or low-dose ICS/LABA plus LTRA → Consider Low-dose MART

With a SABA: If asthma is uncontrolled on moderate-dose ICS; moderate-dose ICS/LABA; moderate-dose ICS plus LTRA and/or LAMA; moderate-dose ICS/LABA plus LTRA and/or LAMA → Consider Moderate-dose MART

If asthma is uncontrolled on high-dose ICS → Refer people to a specialist in asthma care

Newly diagnosed asthma in people aged 12 and over

→ Offer low-dose ICS/formoterol combination inhaler to be taken as needed (AIR therapy)

If asthma is uncontrolled, **offer** Low-dose MART

If asthma is uncontrolled, **offer** Moderate-dose MART

If asthma is uncontrolled, despite good adherence → Check FeNO level, if available, and blood eosinophil count

If either is raised → Refer people to a specialist in asthma care

If neither is raised → Consider a trial of either LTRA or LAMA used in addition to moderate-dose MART for 8 to 12 weeks unless there are side effects. At the end of the trial:

- if asthma is controlled, continue the treatment
- if control has improved but is still inadequate, continue the treatment and start a trial of the other medicine (LTRA or LAMA)
- if control has not improved, stop the LTRA or LAMA and start a trial of the alternative medicine (LTRA or LAMA)

If asthma is uncontrolled → Refer people to a specialist in asthma care

If asthma is controlled, consider stepping down → Low-dose MART

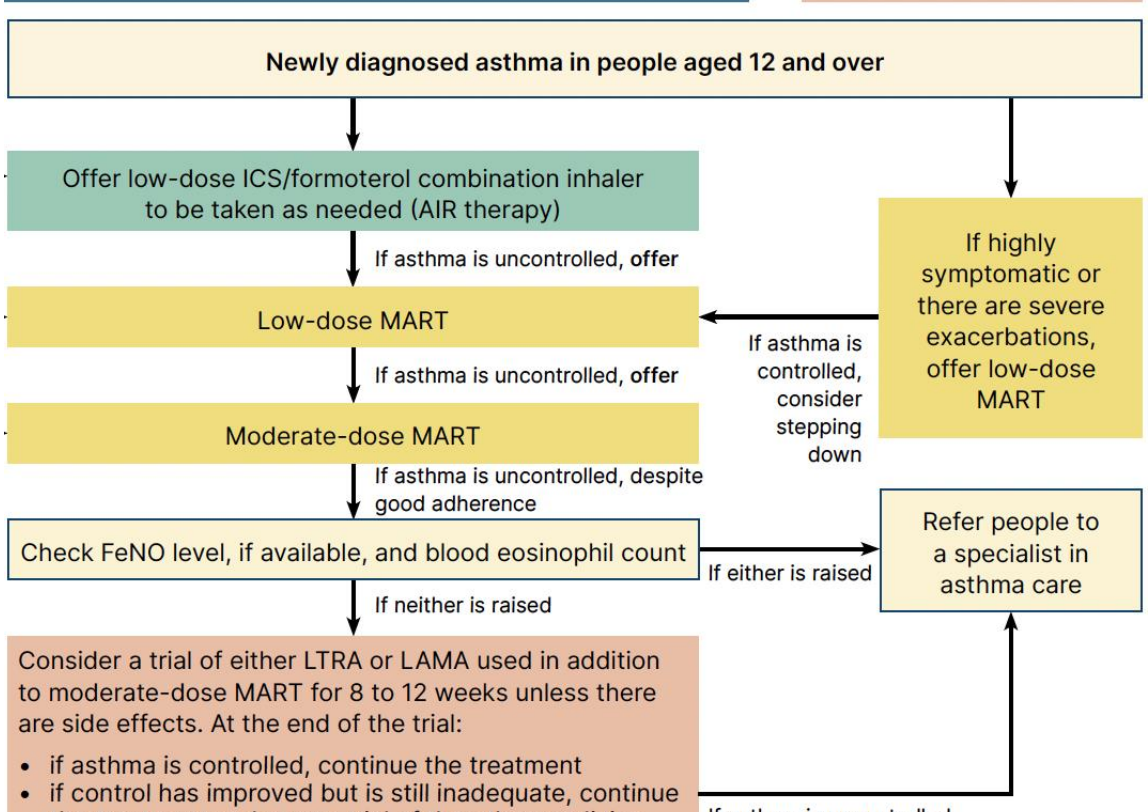
If highly symptomatic or there are severe exacerbations, offer low-dose MART

Uncontrolled asthma: Any exacerbation requiring oral corticosteroids **or** frequent regular symptoms (such as using reliever inhaler 3 or more days a week or night-time waking 1 or more times a week)

ICS, inhaled corticosteroid; **LABA**, long-acting beta$_2$ agonist; **LAMA**, long-acting muscarinic receptor antagonist; **LTRA**, leukotriene receptor antagonist; **MART**, maintenance and reliever therapy (using ICS/formoterol combination inhalers); **SABA**, short-acting beta$_2$ agonist.

British Thoracic Society | NICE National Institute for Health and Care Excellence | Healthcare Improvement Scotland SIGN

BTS ISBN: 978-1-917619-28-8. NICE ISBN: 978-1-4731-6639-4. SIGN ISBN: 978-1-909103-97-9.



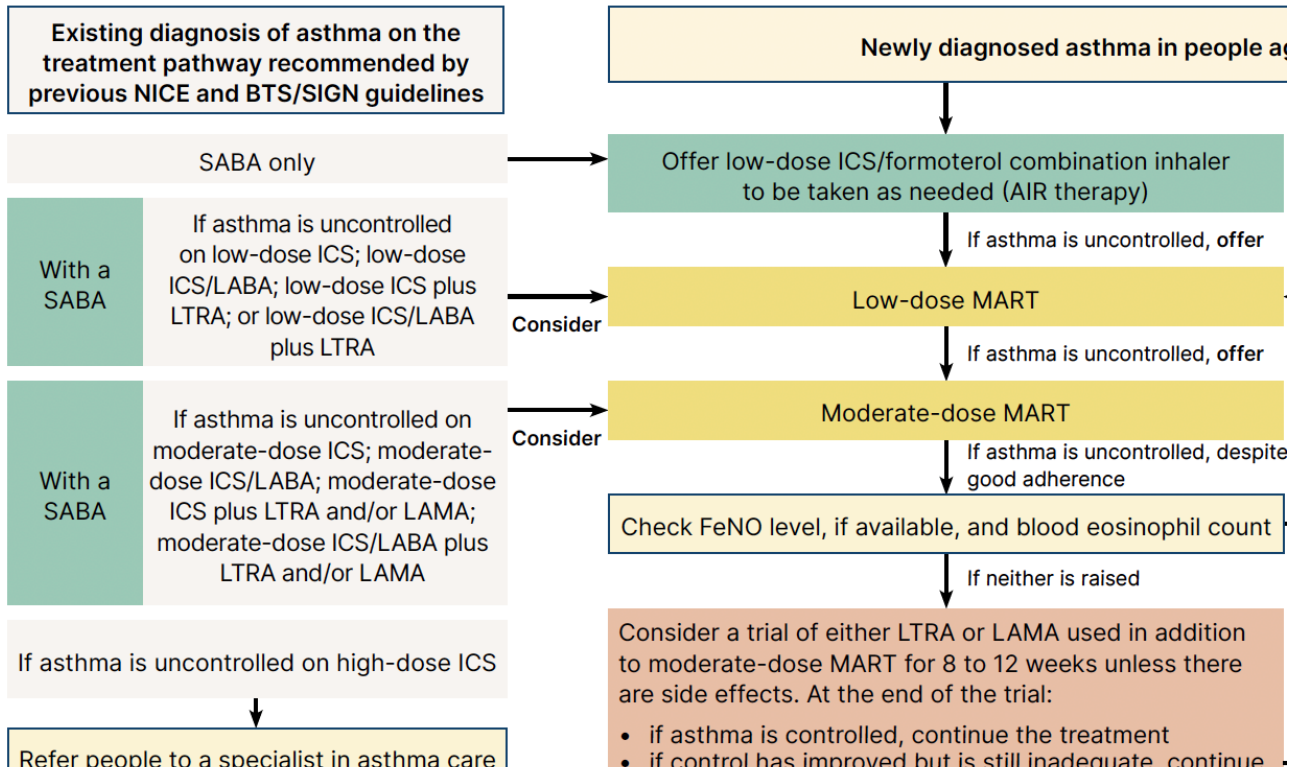
British Thoracic Society, National Institute for Clinical Excellence, Scottish Intercollegiate Guideline Network. NG245 Asthma: diagnosis, monitoring and chronic asthma management (BTS, NICE, SIGN). 2024.

Table 1. ICS dosages for people aged 12 years and over

	Low dose	Moderate dose	High dose
Beclometasone dipropionate			
Standard particle metred dose and dry powder inhalers	200 to 500 micrograms per day in 2 divided doses	600 to 800 micrograms per day in 2 divided doses	1,000 to 2,000 micrograms per day in 2 divided doses
Extra-fine particle metered dose inhalers [1]	100 to 200 micrograms per day in 2 divided doses	300 to 400 micrograms per day in 2 divided doses	500 to 800 micrograms per day in 2 divided doses
Budesonide			
Dry powder inhalers	200 to 400 micrograms per day as a singe dose or in 2 divided doses	600 to 800 micrograms per day as a single dose or in 2 divided doses	1,000 to 1,600 micrograms per day in 2 divided doses
Ciclesonide			
Metered dose inhalers	80 to 160 micrograms per day as a single dose	240 to 320 micrograms per day as a single dose or in 2 divided doses	400 to 640 micrograms per day in 2 divided doses
Fluticasone propionate			
Metered dose and dry powder inhalers (excluding Seffalair Spiromax) [2] [3]	100 to 250 micrograms per day in 2 divided doses	300 to 500 micrograms per day in 2 divided doses	600 to 1,000 micrograms per day in 2 divided doses
Fluticasone furoate			
Dry powder inhalers [4]	Not available	100 micrograms per day as a single dose	200 micrograms per day as a single dose
Mometasone furoate			
Dry powder inhaler	200 micrograms per day as a single dose	400 micrograms per day as a single dose or in 2 divided doses	600 to 800 micrograms per day in 2 divided doses
Inhalation powder capsules [5]	80 micrograms per day as a single dose	160 micrograms per day as a single dose	320 micrograms per day as a single dose

British Thoracic Society, National Institute for Clinical Excellence, Scottish Intercollegiate Guideline Network. NG245 Asthma: diagnosis, monitoring and chronic asthma management (BTS, NICE, SIGN). 2024.

Okay I get this for new patients – but we have lots of people on treatment already?



British Thoracic Society, National Institute for Clinical Excellence, Scottish Intercollegiate Guideline Network. NG245 Asthma: diagnosis, monitoring and chronic asthma management (BTS, NICE, SIGN). 2024.

Poorly controlled and severe asthma – triggers for referral (PCRS 2022 Update)

1. On regular OCS for their asthma
2. Admitted / ED in last year
3. Two or more courses of OCS in last year
4. 6 SABA inhalers or more in last year
5. Ongoing symptoms despite controller medication

Holmes S, Kane B, Pugh A, Whittaker A, McArthur R, Carroll W. Poorly controlled and severe asthma: triggers for referral for adult or paediatric specialist care – a PCRS pragmatic guide. Primary Care Respiratory Update. 2019;Autumn 2019(18):22-7.

Table 3. Biologics approved for the treatment of severe asthma in the UK (correct as of December 2022).

Biologic agent	Mechanism of action	Indication	Dose and administration	Eligibility criteria[a]	Most common adverse events
Omalizumab[17]	Binds to IgE thereby inhibiting IgE-mediated inflammation	For adults and children ≥6 years of age with moderate to severe persistent asthma whose asthma symptoms are not well controlled with asthma medicines called inhaled corticosteroids	Subcutaneous Every 2 week or every week (base on IgE and weight)	IgE-mediated asthma Continuous or frequent OCS (≥4 courses in the previous 12 months)	Headache and injection site reactions (pain, swelling, erythema, pruritus)
Mepolizumab[18]	Inhibits IL-5, a cytokine responsible for the growth, differentiation and activation of eosinophils, thereby reducing the production and survival of eosinophils	For adults and children ≥6 years of age with severe eosinophilic asthma	Subcutaneous Every 4 weeks	If eosinophils ≥300 cells/μL: • ≥4 exacerbations in previous 12 months OR continuous OCS If eosinophils ≥400 cells/μL: • ≥3 exacerbations in previous 12 months needing systemic CS	Headache, injection site reactions (pain, swelling, erythema, pruritus) and back pain
Benralizumab[19]	Inhibits IL-5, a cytokine responsible for the growth, differentiation and activation of eosinophils, thereby reducing the production and survival of eosinophils	For adults with severe eosinophilic asthma inadequately controlled despite high-dose ICS plus LABA	Subcutaneous Every 4 weeks for the first 3 doses, then every 8 weeks	If eosinophils ≥300 cells/μL: • ≥4 exacerbations in previous 12 months OR continuous OCS If eosinophils ≥400 cells/μL: • ≥3 exacerbations in previous 12 months needing systemic CS	Headache and pharyngitis
Reslizumab[20]	Inhibits IL-5, a cytokine responsible for the growth, differentiation and activation of eosinophils, thereby reducing the production and survival of eosinophils	Adults with severe eosinophilic asthma inadequately controlled despite high-dose ICS plus another medicinal product for maintenance treatment	Intravenous 3 mg/kg every 4 weeks	Eosinophils ≥400 cells/μL ≥3 exacerbations in previous 12 months needing systemic CS	Increased blood creatine phosphokinase and anaphylactic reaction
Dupilumab[21]	Inhibits IL-4 through the Type 1 IL-4 receptor and IL-4 and IL-13 signaling through the respective Type 2 receptors	Adults and adolescents (≥12 years) with severe asthma with type 2 inflammation who are inadequately controlled with high dose ICS plus another medicinal product for maintenance treatment	Subcutaneous Every 2 weeks	Type 2 inflammation-associated asthma Raised blood eosinophils (≥150 cells/μL), raised FeNO and ≥4 exacerbations in the last 12 months Ineligible for mepolizumab, reslizumab or benralizumab or has not responded to these agents	Injection site reactions, conjunctivitis, arthralgia, oral herpes and eosinophilia

[a] NICE Technology appraisal guidance: Omalizumab, https://www.nice.org.uk/guidance/ta278/chapter/1-Guidance; mepolizumab, https://www.nice.org.uk/guidance/TA671/chapter/1-Recommendations'; benralizumab, https://www.nice.org.uk/guidance/TA565/chapter/1-Recommendations; reslizumab, https://www.nice.org.uk/guidance/TA479/chapter/1-Recommendations; dupilumab, https://www.nice.org.uk/guidance/TA751/chapter/1-Recommendations.

FeNO, fractionated nitric oxide; ICS, inhaled corticosteroids; IgE, immunoglobulin E; LABA, long-acting beta-agonist; OCS, oral corticosteroid.

Current biologics

- benralizumab (Fasenra)
- dupilumab (Dupixent)
- mepolizumab (Nucala)
- omalizumab (Xolair)
- reslizumab (Cinqaero)
- tezepelumab (Tezspire)

(Licence and indications vary)

Asthma and Lung UK www.asthmaorg.uk (Last accessed in Jan 2023)

Table from PCRU: Holmes S, Carroll W, Mosgrove F, Pugh A, Stone R. Severe Asthma: A pragmatic guide for primary care practitioners. Primary Care Respiratory Update. 2022;25(Winter):7-15.

Thank you any questions?