

Supplementary materials

Table S1 Patient comorbidities by diagnosis

Total	Asthma n (%)	COPD n (%)	ACOS n (%)
5348 (148.4)	4563 (143.4)	469 (197.9)	
No other comorbidities	950 (26.4)	614 (19.3)	27 (11.4)
Alpha-1 antitrypsin deficiency	1 (0.0)	4 (0.1)	1 (0.4)
AIDS/HIV	5 (0.1)	5 (0.2)	0 (0)
Allergic dermatitis	224 (6.2)	15 (0.5)	7 (3.0)
Allergic rhinitis	1619 (44.9)	66 (2.1)	30 (12.7)
Anemia	36 (1.0)	75 (2.4)	7 (3.0)
Anxiety	408 (11.3)	391 (12.3)	42 (17.7)
Arthritis	132 (3.7)	372 (11.7)	33 (13.9)
Atopic dermatitis	50 (1.4)	9 (0.3)	6 (2.5)
Cancer	34 (0.9)	82 (2.6)	6 (2.5)
Crohn's disease	14 (0.4)	21 (0.7)	2 (0.8)
Connective tissue/rheumatological disease	17 (0.5)	10 (0.3)	0 (0)
Cystic fibrosis	2 (0.1)	0 (0)	0 (0)
Dementia	5 (0.1)	36 (1.1)	2 (0.8)
Depression	296 (8.2)	376 (11.8)	57 (24.1)
Dermatitis/eczema	48 (1.3)	23 (0.7)	4 (1.7)
Diabetes	192 (5.3)	531 (16.7)	48 (20.3)
Dyspepsia/stomach pain	91 (2.5)	118 (3.7)	17 (7.2)
Gastroesophageal reflux disease	378 (10.5)	397 (12.5)	47 (19.8)
Glaucoma	25 (0.7)	82 (2.6)	6 (2.5)
Hyperthyroidism	40 (1.1)	45 (1.4)	5 (2.1)
Idiopathic pulmonary fibrosis	1 (0.0)	2 (0.1)	3 (1.3)
Liver disease	16 (0.4)	49 (1.5)	2 (0.8)
Lung cancer	4 (0.1)	54 (1.7)	6 (2.5)
Obesity	320 (8.9)	289 (9.1)	27 (11.4)
Osteoporosis	91 (2.5)	225 (7.1)	32 (13.5)
Prostate disorder	61 (1.7)	287 (9.0)	18 (7.6)
Psoriasis	26 (0.7)	19 (0.6)	4 (1.7)

	Asthma n (%)	COPD n (%)	ACOS n (%)
Total	5348 (148.4)	4563 (143.4)	469 (197.9)
Peptic ulcer disease	14 (0.4)	59 (1.9)	3 (1.3)
Renal failure	19 (0.5)	83 (2.6)	4 (1.7)
Sinusitis	122 (3.4)	42 (1.3)	7 (3.0)
Sleep apnea	107 (3.0)	180 (5.7)	16 (6.8)
Systematic sclerosis	0 (0)	2 (0.1)	0 (0)
Cardiovascular conditions			
	Asthma n (%)	COPD n (%)	ACOS n (%)
Total	4135 (113.9)	5226 (162.5)	384 (161.3)
No cardiovascular comorbidities	2700 (74.3)	941 (29.3)	67 (28.2)
Angina pectoris	29 (0.8)	187 (5.8)	12 (5.0)
Cardiac arrhythmias	64 (1.8)	294 (9.1)	17 (7.1)
Coagulated blood clotting disorder	2 (0.1)	24 (0.8)	3 (1.3)
Congestive heart failure	34 (0.9)	193 (6)	13 (5.5)
Coronary artery disease	51 (1.4)	233 (7.2)	17 (7.1)
Elevated cholesterol/hyperlipidemia	366 (10.1)	895 (27.8)	73 (30.7)
Hypertension	782 (21.5)	1900 (59.1)	138 (58.0)
Myocardial infarction	35 (1.0)	175 (5.4)	15 (6.3)
Peripheral vascular disease	23 (0.6)	195 (6.1)	12 (5.0)
Pulmonary arterial hypertension	20 (0.6)	70 (2.2)	5 (2.1)
Cerebrovascular disease and/or stroke	15 (0.4)	83 (2.6)	10 (4.2)
Thrombosis	14 (0.4)	36 (1.1)	2 (0.8)

Abbreviation: ACOS, asthma–COPD overlap syndrome.

Table S2 Full list of maintenance treatments prescribed to patients (listed by country)

France	MDI	baMDI	DPI	SMI	Unknown	Total
Beclomethasone	15	16	23	0	6	60
Beclomethasone + formoterol FDC	84	0	0	0	0	84
Budesonide	7	0	59	0	0	66
Ciclesonide	6	0	0	0	0	6
Fluticasone	11	0	19	0	1	31
Fluticasone + salmeterol FDC	65	0	339	0	24	428
Formoterol	13	7	40	0	3	63
Formoterol + budesonide FDC	0	0	314	0	0	314
Indacaterol	0	0	172	0	0	172
Mometasone	0	0	6	0	0	6
Salmeterol	0	0	6	0	3	9
Tiotropium	0	0	366	58	0	424
Total	201	23	1344	58	37	1663
Aclidinium	0	0	23	0	0	23
Beclomethasone	7	5	14	0	9	35
Beclomethasone + formoterol FDC	94	0	0	0	0	94
Budesonide	27	0	104	0	0	131
Ciclesonide	4	0	0	0	0	4
Fluticasone	5	0	14	0	1	20
Fluticasone + formoterol FDC	9	0	0	0	0	9
Fluticasone + salmeterol FDC	35	0	180	0	22	237
Fluticasone furoate + vilnaterol FDC	0	0	1	0	0	1
Formoterol	17	29	62	0	16	124
Formoterol + budesonide FDC	0	0	276	0	0	276
Glycopyrronium	0	0	18	0	0	18
Glycopyrronium + indacaterol FDC	0	0	13	0	0	13
Indacaterol	0	0	16	0	0	16
Salmeterol	0	3	3	0	6	12
Tiotropium	0	0	307	31	0	338
Total	198	37	1031	31	54	1351

Italy	MDI	baMDI	DPI	SMI	Unknown	Total
Aclidinium	0	0	33	0	0	33
Beclomethasone	9	0	1	0	2	12
Beclomethasone + formoterol FDC	176	0	0	0	0	176
Budesonide	6	0	14	0	0	20
Ciclesonide	23	0	0	0	0	23
Flunisolide	5	0	0	0	0	5
Fluticasone	68	0	14	0	5	87
Fluticasone + formoterol FDC	26	0	0	0	0	26
Fluticasone + salmeterol FDC	121	0	297	0	31	449
Formoterol	17	5	5	0	3	30
Formoterol + budesonide FDC	0	0	189	0	0	189
Glycopyrronium	0	0	48	0	0	48
Indacaterol	0	0	66	0	0	66
Mometasone	0	0	18	0	0	18
Salmeterol	19	3	21	0	13	56
Tiotropium	0	0	261	27	0	288
Total	470	8	967	27	54	1526

Aclidinium	0	0	83	0	0	83
Beclomethasone	3	0	2	0	2	7
Beclomethasone + formoterol FDC	103	0	0	0	0	103
Budesonide	24	0	72	0	0	96
Ciclesonide	25	0	0	0	0	25
Fluticasone	3	1	8	0	0	12
Fluticasone + salmeterol FDC	77	0	241	0	30	348
Formoterol	3	2	12	0	9	26
Formoterol + budesonide FDC	0	0	328	0	0	328
Glycopyrronium	0	0	50	0	0	50
Indacaterol	0	0	127	0	0	127
Mometasone	0	0	13	0	0	13
Salmeterol	5	0	12	0	7	24
Tiotropium	0	0	354	19	0	373
Total	243	3	1302	19	48	1615

UK	MDI	baMDI	DPI	SMI	Unknown	Total
Acclidinium	0	0	7	0	0	7
Beclomethasone	93	10	7	0	32	142
Beclomethasone + formoterol FDC	39	0	0	0	0	39
Budesonide	1	0	14	0	0	15
Ciclesonide	3	0	0	0	0	3
Fluticasone	11	0	10	0	2	23
Fluticasone + formoterol FDC	3	0	0	0	0	3
Fluticasone + salmeterol FDC	114	0	227	0	71	412
Formoterol	2	0	1	0	0	3
Formoterol + budesonide FDC	0	0	288	0	0	288
Glycopyrronium	0	0	17	0	0	17
Indacaterol	0	0	8	0	0	8
Salmeterol	10	1	2	0	7	20
Tiotropium	0	0	415	20	0	435
Total	276	11	996	20	112	1415

Acclidinium	0	0	43	0	0	43
Beclomethasone	80	5	3	0	2	90
Budesonide	2	0	57	0	0	59
Ciclesonide	7	0	0	0	0	7
Fluticasone	78	2	22	0	3	105
Fluticasone + salmeterol FDC	82	0	619	0	40	741
Fluticasone furoate + vilanterol FDC	0	0	2	0	0	2
Formoterol	0	0	13	0	2	15
Formoterol + budesonide FDC	308	0	0	0	0	308
Indacaterol	0	0	15	0	0	15
Mometasone	0	0	41	0	0	41
Mometasone + formoterol FDC	112	0	0	0	0	112
Salmeterol	14	0	15	0	3	32
Tiotropium	0	0	501	13	0	514
Triamcinolone	2	0	0	0	0	2
Total	685	7	1331	13	50	2086

Japan	MDI	baMDI	DPI	SMI	Unknown	Total
Beclomethasone	13	0	3	0	1	17
Budesonide	2	0	23	0	2	27
Ciclesonide	29	0	0	0	0	29
Fluticasone	15	0	48	0	12	75
Fluticasone + salmeterol FDC	33	0	281	0	70	384
Formoterol	0	0	1	0	0	1
Formoterol + budesonide FDC	0	0	215	0	0	215
Glycopyrronium	0	0	3	0	0	3
Indacaterol	0	0	74	0	0	74
Mometasone	0	0	9	0	0	9
Olodaterol	0	0	0	1	0	1
Salmeterol	4	0	35	0	8	47
Tiotropium	0	0	268	155	0	423
Total	96	0	960	156	93	1305

Bambuterol	0	1	0	0	0	1
Beclomethasone	0	1	0	0	2	3
Budesonide	21	1	75	0	3	100
Dexamethasone	0	0	0	1	1	2
Fluticasone	4	5	1	0	3	13
Fluticasone + salmeterol FDC	225	0	389	0	10	624
Formoterol	2	1	4	1	4	12
Formoterol + budesonide FDC	0	0	147	0	0	147
ICS/LABA (nfs)	0	1	8	0	0	9
Indacaterol	0	0	1	0	0	1
LAMA (nfs)	0	1	0	0	0	1
Mometasone	0	0	2	0	0	2
Other (not stated)	0	0	0	0	2	2
Salmeterol	24	2	31	0	7	64
Tiotropium	0	0	60	1	0	61
Tulobuterol	0	0	1	0	0	1
Total	276	13	719	3	32	1043

Global	MDI	baMDI	DPI	SMI	Unknown	Total
Aclidinium	0	0	189	0	0	189
Bambuterol	0	1	0	0	0	1
Beclomethasone	220	37	53	0	56	366
Beclomethasone + formoterol FDC	496	0	0	0	0	496
Budesonide	90	1	418	0	5	514
Ciclesonide	97	0	0	0	0	97
Dexamethasone	0	0	0	1	1	2
Flunisolide	5	0	0	0	0	5
Fluticasone	195	8	136	0	27	366
Fluticasone + formoterol FDC	38	0	0	0	0	38
Fluticasone + salmeterol FDC	752	0	2573	0	298	3623
Fluticasone furoate + vilanterol FDC	0	0	3	0	0	3
Formoterol	54	44	138	1	37	274
Formoterol + budesonide FDC	308	0	1757	0	0	2065
Glycopyrronium	0	0	136	0	0	136
Glycopyrronium + indacaterol FDC	0	0	13	0	0	13
ICS/LABA (nfs)	0	1	8	0	0	9
Indacaterol	0	0	479	0	0	479
LAMA (nfs)	0	1	0	0	0	1
Mometasone	0	0	89	0	0	89
Mometasone + formoterol FDC	112	0	0	0	0	112
Olodaterol	0	0	0	1	0	1
Other (not stated)	0	0	0	0	2	2
Salmeterol	76	9	125	0	54	264
Tiotropium	0	0	2532	324	0	2856
Triamcinolone	2	0	0	0	0	2
Tulobuterol	0	0	1	0	0	1
Total	2445	102	8650	327	480	12004

Abbreviations: baMDI, breath actuated metered dose inhaler; DPI, dry powder inhaler;

FDC, fixed dose combination; ICS, inhaled corticosteroid; LABA, long-acting β_2 -agonist;

LAMA, long-acting muscarinic antagonist; MDI, metered dose inhaler; nfs, not further

specified; SMI, soft mist inhaler.

Table S3 Full list of inhaler attributes ranked for importance by patients (5-point Likert scale)

	Asthma % (n)	COPD % (n)	ACOS % (n)
It is built to last and will not break easily	27.5 (407)	34.7 (224)	29.0 (11)
The instructions are simple and easy to follow	54.6 (808)	60.9 (393)	52.6 (20)
No need for me to put the medicine into the inhaler before I use it	31.4 (465)	25.3 (163)	15.8 (6)
I do not need to breathe in at the same time as I press my inhaler	17.2 (254)	19.4 (125)	18.4 (7)
I do not need to breathe in hard to inhale my medicine	17.4 (257)	20 (129)	23.7 (9)
I get the same amount of medicine delivered to my lungs each time	28.2 (417)	29.3 (189)	18.4 (7)
It tells me when my dose of medicine has been inhaled correctly	12.8 (189)	12.1 (78)	15.8 (6)
It tells me how many doses of my medicine I have left	24.1 (357)	15.5 (100)	21.1 (8)
Can reuse the inhaler for more than 1 month	7.8 (115)	10.2 (66)	7.9 (3)
The inhaler locks when it is empty so I cannot use it any more	4.6 (68)	3.6 (23)	7.9 (3)
Low/no irritation in mouth and throat	19.5 (288)	19.2 (124)	7.9 (3)
Easy to hold and carry around with me	33.3 (493)	29.2 (188)	23.7 (9)
Total	278.1 (4118)	279.4 (1802)	242.1 (92)

Abbreviation: ACOS, asthma–COPD overlap syndrome.

Table S4 Number of patient comorbidities by whether inhaler device is a reason for choice

	Ease of use/suitability of inhaler device is:		<i>P</i> -value between groups
	NOT a reason for choice	A reason for choice	
Asthma			
	n=1869	n=978	
No other comorbidities, % (n)	31.1 (581)	21.2 (213)	<0.0001
	n=1932	n=1012	
Total number of comorbidities, mean (95% CI)	2.1 (2–2.6)	2.5 (2.4–2.7)	<0.0001
COPD			
	n=1815	n=947	
No other comorbidities, % (n)	21.9 (390)	17.2 (151)	0.0048
	n=1851	n=909	
Total number of comorbidities, mean (95% CI)	3.6 (3.5–3.8)	4.5 (4.3–4.8)	<0.0001
ACOS			
	n=121	n=61	
No other comorbidities, % (n)	14.3 (17)	12.1 (7)	0.8167
	n=121	n=61	
Total number of comorbidities, mean (95% CI)	4.8 (4.0–5.5)	5.4 (4.3–6.5)	0.2423

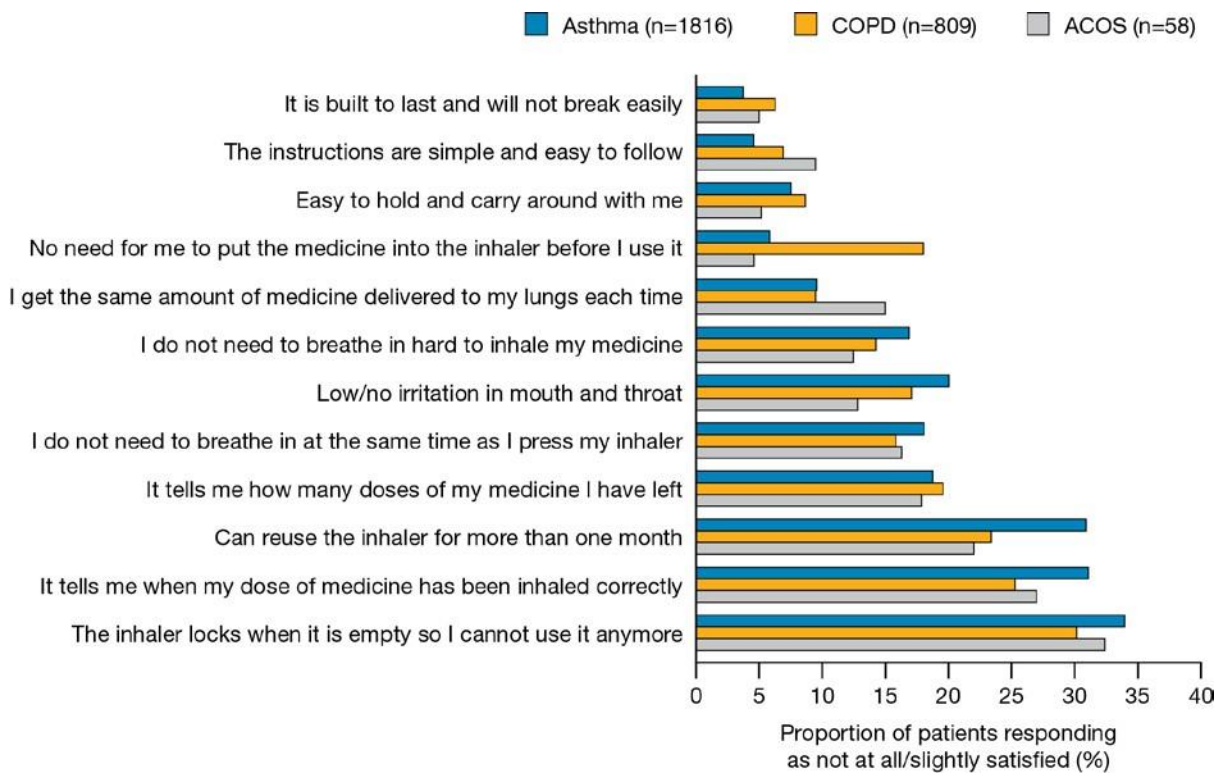
Abbreviations: ACOS, asthma–COPD overlap syndrome; CI, confidence interval.

Table S5 Current device type by whether inhaler device is a reason for choice

	Ease of use/suitability of inhaler device is:		<i>P</i> -value between groups
	NOT a reason for choice	A reason for choice	
Asthma, % (n)	n=1939	n=1014	
MDI	34.7 (673)	34.2 (347)	0.8069
baMDI	1.1 (21)	1.5 (15)	0.3788
DPI	62.9 (1220)	66.0 (669)	0.1064
SMI	0.3 (6)	0.6 (6)	0.3601
Unknown device	4.3 (84)	3.3 (33)	0.1651
COPD, % (n)	n=1861	n=911	
MDI	18.9 (351)	16.5 (150)	0.1278
baMDI	0.8 (15)	1.1 (10)	0.5214
DPI	87.6 (1631)	90.0 (820)	0.0672
SMI	3.9 (73)	5.9 (54)	0.0202
Unknown device	4.6 (86)	2.7 (25)	0.0176
ACOS, % (n)	n=121	n=61	
MDI	29.8 (36)	18.0 (11)	0.1071
baMDI	1.7 (2)	0 (0)	0.5519
DPI	82.6 (100)	86.9 (53)	0.5256
SMI	2.5 (3)	1.6 (1)	1
Unknown device	5.8 (7)	11.5 (7)	0.2375

Abbreviations: ACOS, asthma–COPD overlap syndrome; baMDI, breath actuated metered dose inhaler; DPI, dry powder inhaler; MDI, metered dose inhaler; SMI, soft mist inhaler.

Figure S1 Inhaler satisfaction as reported by patients by diagnosis (not at all/slightly satisfied)



Abbreviation: ACOS, asthma–COPD overlap syndrome.