Oral Corticosteroid Prescription Patterns for Asthma in France, Germany, Italy, and the United Kingdom

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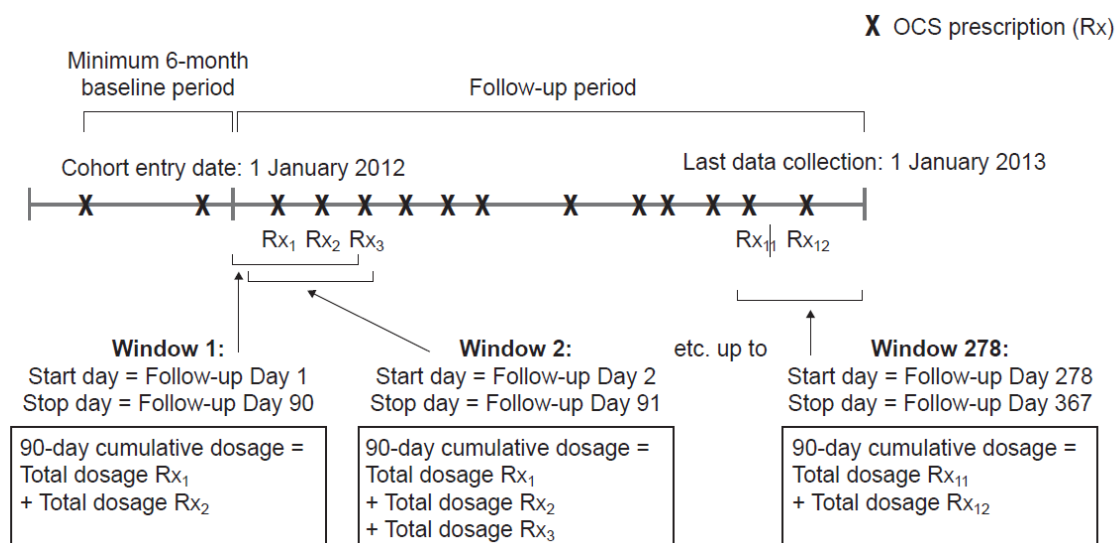
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Supplementary Material 01: Algorithm to Identify High OCS Use

Patients who were prescribed OCS ≥450 mg (or prednisolone/prednisone equivalent dosage) within a rolling 90-day window during the follow-up period were categorised as high OCS users.

The rolling 90-day window to determine high OCS use was derived algorithmically, as depicted in Figure S1.

The cumulative OCS dosage within any 90-day window was calculated by deriving the total dosage for each OCS prescription and summing the total dosage of all OCS prescriptions within the window. The date at which a patient was considered a high OCS user (high OCS user date) was the date of the first prescription in the sequence that met or exceeded the 450-mg threshold.

Figure S1. Algorithm for Deriving the Rolling 90-Day Window to Identify High OCS Use

OCS, oral corticosteroids; Rx, prescription.

Supplementary Material 02

Table S1. Longitudinal Changes in Average Daily OCS Dosage (Mean mg [SD]) During Follow Up

Country	Day 1 to 90	Day 91 to 180	Day 181 to 270	Day 271 to 360	Day 361 to 450	Day 451 to 540	Day 541 to 630	Day 631 to 720
UK	8.4 (6.1)	2.9 (5.1)	2.4 (4.6)	2.3 (4.4)	2.2 (4.2)	2.1 (4.0)	2.0 (4.4)	2.0 (4.2)
Italy	7.2 (3.7)	1.9 (3.7)	1.4 (3.3)	1.4 (3.0)	1.3 (3.0)	1.2 (2.8)	1.1 (2.8)	1.2 (2.8)
France	7.7 (9.4)	1.9 (4.9)	1.4 (4.5)	1.3 (4.0)	1.4 (4.6)	1.2 (4.1)	1.1 (3.5)	1.3 (5.5)
Germany GPs	10.4 (8.7)	2.7 (5.5)	2.1 (5.1)	1.9 (5.0)	2.0 (4.7)	1.9 (4.6)	1.6 (4.1)	1.7 (4.3)
Germany pulmonologists	8.5 (5.6)	1.8 (3.9)	1.6 (3.8)	1.5 (3.8)	1.7 (4.1)	1.5 (3.9)	1.5 (4.0)	1.6 (4.2)

GPs, general physicians; OCS, oral corticosteroids; SD, standard deviation; UK, United Kingdom.

Supplementary Material 03

Table S2. Cross-Tabulation of OCS User Status (During Follow Up) by GINA Step at Baseline

| GINA Step, % | UK | | | Italy | | | France | | | Germany | | | | | |
| | | | | | | | | | | GPs | | | Pulmonologists | | |
	High OCS user	Low OCS user	Non-OCS user	High OCS user	Low OCS user	Non-OCS user	High OCS user	Low OCS user	Non-OCS user	High OCS user	Low OCS user	Non-OCS user	High OCS user	Low OCS user	Non-OCS user
Mild (Steps 1–2)	3.4	17.8	78.8	6.0	29.0	64.9	6.6	33.1	60.4	3.6	8.4	88.0	4.2	8.5	87.3
Moderate (Step 3)	5.4	23.4	71.2	7.6	29.8	62.6	8.5	35.8	55.7	5.0	8.0	87.1	6.0	10.7	13.2
Severe (Steps 4–5)	15.0	31.2	53.9	12.0	30.5	57.5	11.8	37.0	51.2	12.9	10	77.1	14.7	13.2	72.2

GINA, Global Initiative for Asthma; GPs, general physicians; OCS, oral corticosteroids; UK, United Kingdom.

Supplementary Material 04

Table S3. Average OCS Use and Prescription by GINA Severity and Exacerbations

	UK				Italy				France				Germany (GPs)				Germany (pulmonologists)			
	Severe	Non-severe	EX (Y)	EX (N)	Severe	Non-severe	EX (Y)	EX (N)	Severe	Non-severe	EX (Y)	EX (N)	Severe	Non-severe	EX (Y)	EX (N)	Severe	Non-severe	EX (Y)	EX (N)
	102,416	315,321	47,908	369,829	32,539	42,984	13,498	62,025	38,979	71,939	32,724	78,194	13,174	63,839	3,270	73,743	6,528	14,966	726	20,768
Number of OCS prescriptions per year of follow up, mean (SD)	0.7 (1.9)	0.2 (0.8)	1.3 (2.7)	0.2 (0.7)	0.4 (1.0)	0.2 (0.7)	0.7 (1.5)	0.2 (0.6)	0.4 (0.8)	0.3 (0.6)	0.6 (0.9)	0.2 (0.5)	0.2 (0.8)	0.09 (0.4)	0.6 (1.3)	0.09 (0.4)	0.2 (0.7)	0.09 (0.3)	0.5 (1.2)	0.1 (0.4)
Number of OCS prescriptions per year of follow up, %																				
≥1	17.7	5.5	30.2	5.7	10.6	6.7	20.1	5.8	13.9	9.9	21.2	7.2	7.6	2.3	21.2	2.4	7.6	2.1	16.0	3.4
≥2	9.0	2.1	17.3	2.1	4.3	2.2	8.6	1.9	4.7	2.9	7.1	2.0	4.0	0.8	9.0	1.0	3.2	0.7	6.5	1.3
≥3	5.7	1.2	11.5	1.1	2.4	1.1	5.2	0.9	2.0	1.0	2.8	0.7	2.4	0.4	4.8	0.5	1.7	0.3	4.0	0.6
≥4	4.1	0.8	8.7	0.7	1.5	0.7	3.4	0.5	0.9	0.4	1.3	0.3	1.4	0.2	3.0	0.3	0.9	0.1	1.9	0.3
Average daily OCS dosage, mg																				
Mean (SD)	0.5 (1.7)	0.1 (0.6)	0.8 (2.0)	0.1 (0.7)	0.2 (0.8)	0.1 (0.4)	0.3 (1.0)	0.1 (0.5)	0.3 (1.3)	0.2 (0.6)	0.4 (1.2)	0.2 (0.8)	0.4 (1.8)	0.09 (0.6)	0.4 (1.6)	0.1 (0.9)	0.3 (1.4)	0.1 (0.5)	0.5 (1.9)	0.1 (0.8)
Median	0	0	0.1	0.0	0	0	0.06	0.0	0	0	0.1	0.0	0	0	0.07	0.0	0	0	0.0	0.0
Average daily OCS dosage, %																				
<2.5 mg	95.6	99.2	91.8	99.2	98.0	99.4	97.1	99.2	97.9	99.2	97.5	99.2	95.2	99.3	95.7	98.7	95.9	99.3	93.8	98.4

2.5–5 mg	2.2	0.5	4.3	0.5	1.3	0.4	1.8	0.5	1.4	0.7	1.8	0.5	2.4	0.5	2.5	0.7	2.3	0.6	4.3	1.0
5–7.5 mg	0.9	0.2	2.1	0.1	0.5	0.1	0.7	0.2	0.3	0.1	0.3	0.1	1.1	0.1	1.0	0.3	0.9	0.1	0.6	0.3
≥7.5 mg	1.2	0.1	1.9	0.2	0.3	0.1	0.4	0.1	0.4	0.1	0.3	0.2	1.3	0.1	0.8	0.3	0.9	0.1	1.4	0.3

EX, exacerbations; GINA, Global Initiative for Asthma; GPs, general physicians; OCS, oral corticosteroids; SD, standard deviation; UK, United

Kingdom.

Supplementary Material 05

Table S4. Baseline Clinical Characteristics of Patients According to OCS Use Category

| | UK (N= 417,737) | | | Italy (N=75,523) | | | France (N=110,918) | | | Germany | | | | | |
| | | | | | | | | | | Germany GP (n=77,013)s | | | Germany pulmonologists (N=21,494) | | |
Characteristics	High OCS user (n=28,774)	Low OCS user (n=95,748)	Non-OCS user (n=293,215)	High OCS user (n=6,679)	Low OCS user (n=22,503)	Non-OCS user (n=46,341)	High OCS user (n=9,751)	Low OCS user (n=38,834)	Non-OCS user (n=62,333)	High OCS user (n=4,330)	Low OCS user (n=6,571)	Non-OCS user (n=66,112)	High OCS user (n=1,712)	Low OCS user (n=2,279)	Non-OCS user (n=17,503)
Age [y], Mean (SD)	52.7 (17.6)	45.6 (18.7)	40.4 (18.8)	54.5 (18.0)	45.8 (19.0)	45.2 (19.8)	46.4 (17.6)	42.2 (18.7)	42.3 (20.4)	51.3 (17.7)	44.7 (17.8)	42.8 (18.4)	50.5 (16.2)	50.1 (16.6)	46.9 (18.0)
Female, %	66.9	64.1	54.1	65.6	61.1	54.1	62.5	63.0	55.3	63.3	59.5	57.3	66.2	67.9	62.2
BMI# [kg/m^2]															
Mean (SD)	29.8 (6.9)	29.0 (6.6)	27.6 (6.1)	27.5 (5.6)	26.9 (5.6)	26.6 (5.5)	28.9 (6.6)	27.2 (6.1)	27.2 (6.3)	28.9 (6.1)	28.5 (6.0)	28.1 (6.2)	27.9 (6.1)	29.0 (6.0)	28.1 (5.7)
Underweight, %	1.3	1.4	2.0	2.2	2.9	3.4	2.1	3.4	4.0	2.3	1.3	1.9	0.8	0	1.2
Healthy, %	24.1	28.3	35.9	33.4	37.8	38.9	28.1	37.8	38.6	21.5	28.9	32.8	38.5	23.6	32.3
Overweight, %	32.8	32.8	33.3	36.1	34.3	34.0	31.6	30.8	29.6	39.7	37.9	32.8	30.3	39.9	33.9
Obese, %	41.8	37.5	28.8	28.4	25.0	23.6	38.2	28.0	27.7	36.5	31.9	32.6	30.3	36.5	32.6
Number of exacerbations in the baseline period, %															
0	62.8	81.4	93.4	69.5	74.3	87.7	49.0	61.0	79.8	91.1	79.8	97.6	91.5	91.5	97.8
1	20.7	15.2	5.9	20.2	20.4	11.0	36.2	32.7	18.5	6.4	17.6	2.2	7.0	7.9	2.2
≥2	16.5	3.4	0.7	10.3	5.3	1.3	14.8	6.3	1.7	2.6	2.6	0.1	1.5	0.5	0.1
Asthma medication use in the baseline period, %															

Any ICS medication	85.7	79.5	67.6	84.3	79.9	78.7	67.1	60.3	55.1	69.5	58.3	59.8	80.4	78.4	71.2
SABA only (inhaled)	8.0	15.2	27.0	6.1	9.8	12.5	10.0	16.0	24.0	15.3	18.8	28.2	4.0	6.2	7.8
ICS/LABA or ICS+LABA	56.3	40.4	25.2	57.3	48.0	45.2	53.3	45.7	41.1	53.7	41.4	41.1	65.9	57.2	48.7
ICS/LABA/LAMA or ICS/LABA+LAMA	2.9	0.7	0.3	3.5	1.0	0.8	2.0	0.9	0.8	1.3	0.4	0.3	2.8	1.1	0.6
Any LTRA	13.3	6.2	2.7	14.9	10.7	8.3	16.3	11.3	9.0	4.1	2.7	1.9	16.8	7.1	4.2
Any theophylline	2.8	0.6	0.2	2.0	1.2	1.0	0.9	0.3	0.3	5.7	2.2	1.3	11.6	5.1	2.3
Other anti-allergic agents	24.4	18.8	14.1	31.6	31.1	24.8	45.9	40.9	34.5	10.1	8.6	7.5	6.2	5.4	2.8
Asthma severity in the baseline period, %															
Mild (GINA Steps 1–2)	20.9	32.9	47.6	28.2	40.4	43.8	32.8	41.6	47.3	32.4	50.2	52.2	20.2	30.5	40.7
Moderate (GINA Step 3)	25.9	33.8	33.6	13.3	15.5	15.8	20.1	21.3	20.7	28.3	29.9	32.4	23.8	31.8	32.4
Severe (GINA Steps 4–5)	53.2	33.3	18.8	58.5	44.1	40.4	47.1	37.1	32.0	39.3	20.0	15.4	56.0	37.7	26.9
Comorbidities, %															
Cardio-cerebrovascular disease	11.5	6.7	4.3	14.5	8.0	7.6	5.8	4.5	5.1	16.6	9.7	8.4	3.8	3.7	2.2
Cerebrovascular accident – stroke	6.0	3.5	2.4	10.1	6.1	5.6	3.1	2.7	2.9	8.2	5.0	4.3	1.2	1.4	0.8
Heart failure	4.2	2.2	1.2	4.1	1.7	1.8	1.7	1.1	1.6	8.9	4.7	4.1	2.2	1.9	1.0
Myocardial infarction	3.4	2.0	1.3	2.0	1.0	1.1	1.5	1.0	1.2	3.2	1.8	1.7	0.7	0.7	0.6
Renal impairment	14.6	9.0	5.9	6.9	3.7	3.3	4.3	3.7	2.6	5.0	4.1	3.3	0.3	0.1	0.1
Type 2 diabetes mellitus	21.1	14.0	9.6	7.0	4.9	5.6	8.0	6.0	8.3	14.6	9.8	8.9	2.0	2.7	2.1
Glaucoma	3.7	2.4	1.7	6.2	4.3	3.5	2.3	1.7	1.7	2.4	1.6	1.3	0.8	0.7	0.5
Osteoporosis	8.9	4.2	2.5	22.2	14.1	9.6	6.2	4.8	4.2	11.0	5.1	3.8	4.1	2.0	1.1
Peptic ulcer	3.4	2.2	1.5	4.3	3.1	2.4	3.9	2.6	2.3	3.2	2.2	1.9	0.4	0.3	0.1
Pneumonia	8.8	5.2	3.5	8.6	5.0	3.7	12.2	9.6	6.4	14.0	10.0	6.7	7.8	5.8	2.5

BMI, body mass index; GINA, Global Initiative for Asthma; GPs, general physicians; ICS, inhaled corticosteroids; LABA, long-acting

β_2-agonists; LAMA, long-acting muscarinic antagonists; LTRA, leukotriene receptor antagonists; OCS, oral corticosteroids; SABA, short-acting

β_2-agonists; SD, standard deviation; UK, United Kingdom; y, years.

[#]BMI is calculated for adult patients only. Underweight (<18.5 kg/m^2); healthy (≥18.5–<25 kg/m^2); overweight (≥25–<30 kg/m^2);

obese (≥30 kg/m^2).