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Defining High Oral Corticosteroid Use in Asthma Patients

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Background

Oral corticosteroids (OCS) are currently listed in the National, Heart, Lung and Blood Institute (NHLBI) guidelines as an option for treatment of patients with severe (EPR3 step 6) asthma.[1] However, chronic use is associated with a variety of serious adverse events, including osteoporosis, fractures, diabetes mellitus, cataracts, hypertension, and others.[2-4]

Safety thresholds for low-dose OCS therapy have not been established.[5,6] Consequently, there is no practical designation of high or low OCS exposure.

We sought to use an administrative claims database in order to determine a useful and clinically meaningful working definition of high OCS use in adult asthma patients that can be applied to inform treatment decisions of patients with severe asthma and avoid toxic, long-term consequences of OCS use.

Objective

Our study objective was to establish a definition of high OCS use in adult asthma patients, based on current distribution of OCS use in clinical practice in the US, using data from a commercial healthcare claims database.

Methods

Study Design:

- Retrospective cohort study

Data Source:

- Commercial healthcare claims database (2008)
  - ➢ Database contains 10 million covered lives from all regions of the United States and is HIPAA-compliant

Study Population:

- Adult asthma patients (*Figure 1*)

Inclusion Criteria:

- Had at least 2 medical claims with asthma as 1 of the listed diagnoses (ICD-9-CM code 493.x); AND
- Had filled at least 2 asthma medications (inhaled corticosteroids [ICS], leukotriene modifiers, inhaled long-acting and short-acting β2-agonists, mast cell stabilizers, methylxanthines, omalizumab, and anti-asthmatic drug combinations); AND
- Were 18+ years of age at the end of 2008

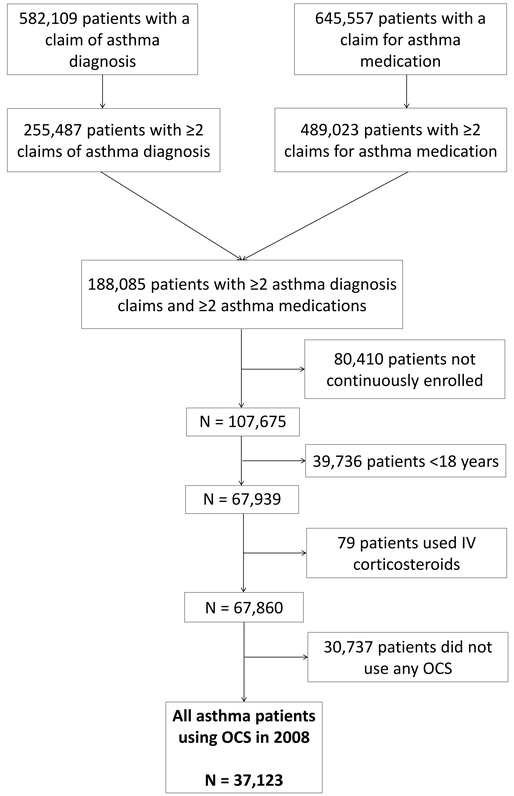
Exclusion Criteria:

- Were not continuously enrolled during 2008; OR
- Used any intravenous (IV) corticosteroid medications

Statistical Analysis:

- Descriptive exploratory analysis examining distribution of OCS dosing by total days of supply, number of OCS prescribing units (single medication fill with ≤30 days of supply), and cumulative prednisone-equivalent dose
  - ➢ Cumulative prednisone-equivalent dose = mg of corticosteroids converted to equivalent quantity of prednisone, based on relative potency, over 1-year period
- All analyses were performed using SAS® 9.4 (SAS Institute, Cary, NC).

Figure 1. Patient Identification Flowchart



Results

Figure 2. Total Days of Oral Corticosteroid Supply

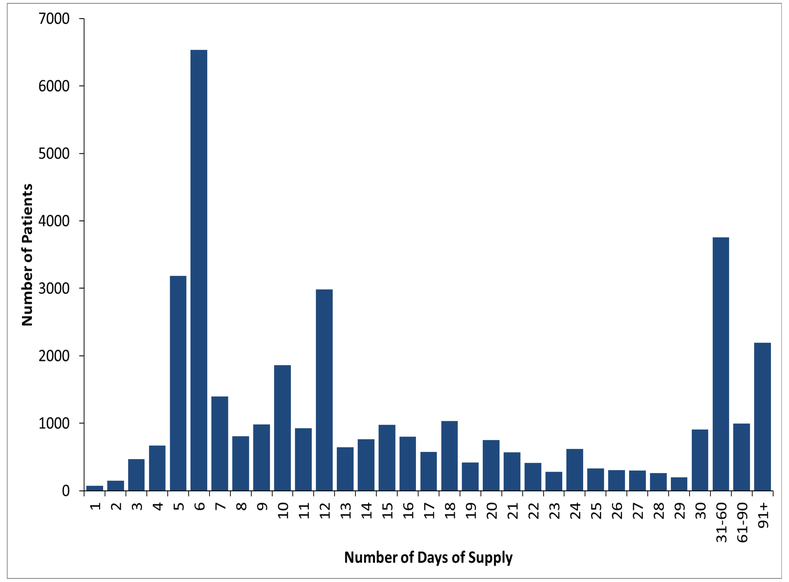


Table 1. Oral Corticosteroid Use Stratified by Days of Supply

		Total Days of Supply				
		1-29	30+	30-59	60-89	90+
No. of patients		29,272	7,851	4,417	1,108	2,326
No. of OCS dispensing units [a]	Mean	1.55	4.91	3.29	4.56	8.16
	Median	1.00	4.00	3.00	4.00	7.00
Average days of supply per dispensing unit [a]	Mean	7.36	18.53	15.02	18.40	25.26
	Median	6.00	17.33	12.67	16.90	27.00
Total prednisone-equivalent dose, mg	Mean	320.77	1788.23	1027.87	1767.73	3241.89
	Median	250.00	1260.00	965.00	1682.50	2700.00

[a] A prescription fill with 30 or fewer days of supply is counted as 1 unit. The number of units for fills with more than 30 days of supply is calculated as the days of supply divided by 30 and rounded down to an integer.

Table 2. Cumulative Prednisone-Equivalent Dose vs. Total Days of Supply

Dose (mg)	1-29 Days of Supply		30+ Days of Supply	
	% of Patients	Cumulative %	% of Patients	Cumulative %
50	0.50	0.50	0.03	0.03
250	12.11	50.39	0.61	1.78
500	4.36	82.16	2.06	8.99
750	1.43	94.45	3.20	21.70
1000	0.73	98.55	3.92	36.50

- The median total cumulative dose of OCS for adult patients with <30 total annual days of supply was **250 mg**, while the median total cumulative dose of OCS with ≥30 total annual days of supply was **1260 mg** (*Table 1*). The median number of OCS dispensing units received by those with <30 annual days of supply was **1.00**, compared to **4.00** for those with ≥30 total annual days of supply.
- **Less than 1.5%** of adult patients with <30 total days of supply used more than 1000 mg OCS, compared to **63.5%** of patients with ≥30 total annual days of supply (*Table 2*).
- The above results demonstrate a substantial difference in the level of OCS exposure at the 30 days of supply mark.
- The distribution of OCS dosing by total days of supply (*Figure 2*) showed that the most commonly reported duration of OCS was **6 days**, which is representative of how OCS bursts are administered (e.g., methylprednisolone "dose-packs" are often prescribed in 6-day increments). Duration of OCS fills in other multiples of 6 were also commonly observed, suggesting that OCS prescriptions were often given in short 6-day increments as opposed to long 30-day batches.

Conclusions

- We described a simple method for stratifying OCS use into two clinically meaningful and analytically straightforward categories. Many adult patients with moderate to severe asthma receive corticosteroids, and the short- and long-term impact of this exposure has not been well-studied. These categories may be useful for quantifying OCS exposure and assessing adverse event risk in future studies of asthma patients.
- Thirty days or greater supply of OCS annually was considered a practical and appropriate cutoff point for determining high OCS use in adult asthma patients. This was the equivalent of exposure to ≥5 standard 6-day methylprednisolone dose-packs.
- Our data suggest that although most patients in this cohort were receiving OCS bursts as opposed to 30-day prescriptions, simply receiving at least 5 OCS bursts annually was sufficient to expose patients to a high quantity of OCS (>1000 mg).
- Limitations include inclusion of only commercially insured patients in the study cohort; the results may not necessarily be applicable to other groups. Claims databases record only medication fills, not medication consumption.

References

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