

## Drug Use Evaluation: Asthma Rescue Inhalers

### Plain Language Summary:

- Clinical practice guidelines for the treatment of asthma have changed in the past few years. Inhaled medicines called short-acting beta agonists (SABA) alone are no longer recommended for most patients with asthma, and may actually make asthma control worse when used without other asthma medicines. An example of a short-acting beta agonist is albuterol.
- The purpose of this evaluation is to assess if short-acting beta agonist use has changed to match recommendations in the current clinical guidelines, and if overall use of short-acting beta agonist inhalers is appropriate in fee-for-service/open card Medicaid members.
- We found that many patients with asthma who are using short-acting beta agonists are not receiving additional medications for asthma. Most patients should be taking a medicine called an inhaled corticosteroid, such as budesonide. An inhaled corticosteroid paired with a different beta agonist (formoterol) decreases severe asthma attacks compared to only using short-acting beta agonist inhalers. Many patients have filled prescriptions for so many short-acting beta agonist inhalers that they may be at higher risk of bad health outcomes. These include hospitalization and death. Most of the patients who received a short-acting beta agonist inhalers did not have asthma or chronic obstructive pulmonary disease (COPD) in medical records. It is unclear if this is due to inaccurate medical records or other medical uses of this type of medicine.
- DURM recommends putting in place a quantity limit for short-acting beta agonist inhalers to prevent potentially harmful overuse in patients.
- DURM recommends notifying medical prescribers of asthma patients who appear to be receiving short-acting beta agonist inhalers when other therapy might be more beneficial. Other types of inhalers, which match current guideline recommendations are available to fee-for-service/open card Medicaid members.

### Research Questions:

- What proportion of Fee-For-Service (FFS) members with claims for a SABA rescue inhaler also have claims for controller inhaler therapy?
- How many FFS members have multiple claims for SABA inhalers indicating potential overuse (overuse is defined as daily use of  $\geq 3$  canisters [200 count] in a year with extremely high use as 12 or more canisters in a year)?
- Do FFS members with SABA claims, indicating overuse or monotherapy, have more adverse outcomes (e.g., hospitalizations, emergency department visits, or asthma exacerbations) than those using SABA with controller medications and without excessive use of a controller?
- Are there subgroups of FFS members based on demographics (e.g., age, diagnoses, or symptom severity) who are more likely to overuse SABA in their asthma treatment regimen?

## Conclusions:

- There were 459 patients with an asthma diagnosis identified as having a SABA claim. Controller therapy of some kind was identified in 41.4% (N=190) of those patients (**Table 3**).
- Potential SABA overuse was identified in 208 (45%) of the 459 patients with diagnosed asthma. Extremely high use was identified in 78 patients (17%) carrying an asthma diagnosis (**Table 2**).
- Oral corticosteroid use appeared highest for members with claims for more than 5 inhalers (28.7%; N=62). The rate of emergency room visits was also highest in those with more than 5 inhalers compared to the other subgroups (**Table 5**). Hospitalization rates were similar among subgroups, while deaths were almost twice as common in members receiving 2 to 5 inhalers (2.2%, N=17) or more than 5 inhalers (2.3%; N=5) compared to all members with SABA prescriptions (1.5%; N=28) and SABA monotherapy (1.2%; N=16). Given high rate of non-asthma diagnoses and differences in number of inhalers seen in subgroups with and without asthma or COPD, the outcome groups compared in **Table 5** are likely fundamentally different patient populations.
- The most common asthma subtype in patients with SABA claims was “unknown or unspecified” (47.9%, 220 of 459). Most patients identified were female assigned at birth (64.9%) and of Native American or Alaskan native (HNA) ancestry (48.7%). The HNA population is highly represented in fee-for-service/open card Medicaid compared to the general Medicaid population.
- Patients with neither a diagnosis of asthma or COPD represented most of the population identified as having a SABA claim (70.2%, 1311 of 1867). These patients were most likely to only have claims for 1 (52.6%, N=689) or 2 (20.8%, N=273) inhalers in the 6 month follow up period (**Table 2 and 6**), though 242 patients (18.5%) had claims for 3-5 inhalers and 107 patients (8.2%) had claims for 6 or more inhalers. A post-hoc analysis revealed many of these patients had cough (13.6%, N=178), nicotine dependence (12.7%, N=167), and abnormalities of breathing (11.6%, N=152). They likely received SABA for acute infections such as upper respiratory tract infections, viral illnesses, acute pharyngitis (**Table 6**).

## Recommendations:

- Implement one-time targeted provider fax notification requesting SABA therapy reassessment for specific patients identified in this DUE:
  - All patients without either asthma or COPD diagnosis with more than 2 SABA inhalers in 6 months.
  - All patients with asthma who are 6 years or older identified as having SABA monotherapy.
  - All patients with mild persistent asthma, moderate persistent asthma, or severe persistent asthma with any SABA claim regardless of concomitant controller therapy.
  - All patients with asthma and claims for 2 or more SABA inhalers in 6 months regardless of concomitant controller therapy.
- Implement targeted ongoing RetroDUR with provider fax notification when 3 SABA inhalers are filled within 6 months. Exclude patients with COPD diagnosis.
- The committee considered and rejected implementation of a quantity limit for more than 6 SABA claims in 6 months with exclusion of patients with a COPD diagnosis. The committee asked staff to investigate the possibility of point-of-sale educational messaging that will not stop a prescription fill.

## Background

Asthma is a heterogeneous, non-communicable disease, typically characterized by chronic airway inflammation. Typical respiratory symptoms include wheezing, shortness of breath, chest tightness, and cough.<sup>1</sup> Patients with this disease exhibit variable expiratory airflow limitation, which may become persistent.<sup>2</sup> Asthma severity varies is typically treated with inhaled beta-agonists and different strengths of inhaled corticosteroids (ICS).<sup>1</sup> Other therapies for asthma include oral leukotriene receptor antagonists (LTRA), inhaled muscarinic agents, and injectable biologic agents, which are reserved for patients with more severe and difficult to control asthma.<sup>1</sup> Oral corticosteroids are used in exacerbations and can be considered in those presenting with severe uncontrolled asthma.<sup>1</sup> Treatment

regimens involve “reliever” therapy for immediate symptoms and “controller” therapy to prevent exacerbations and control symptoms.<sup>1</sup> Treatments progress along a stepwise algorithm based on frequency and severity of symptoms.<sup>1</sup> The Global Initiative for Asthma (GINA) algorithms differ slightly between age groups.<sup>1</sup>

In 2019, GINA changed recommendations regarding use of inhaled SABA as evidence shows that patients treated with SABA-monotherapy had an increased risk of severe exacerbations and that ICS significantly reduces the risk.<sup>2,3</sup> Higher use of SABA (ie., Daily use or ≥3 canisters [200 count] in a year) is associated with higher risk for severe exacerbations while 12 or more canisters in a year is associated with much higher risk of death.<sup>1</sup> Guidelines for COPD differ.<sup>4</sup>

Step 1 treatment for adults and adolescents (12 years and older) recommend ICS containing controller treatment. These recommendations were clarified in 2021.<sup>1,2</sup> Current recommendations are for Track 1 (preferred) use of ICS-formoterol as the reliever medication.<sup>1</sup> Formoterol is a long-acting beta agonist (LABA) with rapid onset. Track 2 (alternative) recommendations include a SABA reliever with use of an ICS anytime SABA is taken either as a combination inhaler or separate inhalers (Step 1) or low dose maintenance ICS (Step 2).<sup>1</sup>

Treatment recommendations for children (6 to 11 years) differs as there is one track and Step 1 includes low-dose ICS as a controller, taken when SABA reliever is taken, with an alternative for daily low dose ICS. Step 2 involves daily low dose ICS as the controller, though a low dose ICS taken when SABA reliever taken or a daily LTRA are alternatives as controllers. Children 5 years and younger in Step 1 are the only age group where SABA reliever without a separate controller are recommended. Daily ICS (preferred) or daily LTRA (alternative) or short courses of ICS (alternative) are the controller therapies for Step 2 in this age group.

Based on this guidance, SABA use without ICS is only preferred in ages 5 years and younger in Step 1.<sup>1</sup> Certain patients 5 years and younger and 6 to 11 years in Step 2 using daily LTRA as an alternative controller therapy may have SABA reliever use without ICS.<sup>1</sup> Those patients aged 12 years and older should preferentially receive ICS-formoterol rather than a SABA with separate ICS or SABA-ICS combination product, but all patients in this age range should have some form of ICS controller in these steps.<sup>1</sup>

Inhalers with SABA, ICS, LABA and their combinations are categorized in several different preferred drug list (PDL) classes. The LABA and ICS single agent classes have a prior authorization (PA) for non-preferred agents to ensure appropriate combination use with other single-agent inhalers. Combination LABA-ICS. Inhalers only have preferred and non-preferred status. There are preferred options of SABA (albuterol) in inhaler and nebulizer form, salmeterol xinafoate (SEREVENT DISKUS), and multiple single agent ICS. Multiple LABA-ICS combinations are preferred, including two different ICS-formoterol options. Gross costs for SABA and ICS classes were approximately \$110,000 in the first quarter of 2023. Combination LABA-ICS costs were \$200,000 during the same time period while single agent LABA use was minimal compared to the other two. Drugs in these classes can additionally be used in patients with COPD.

#### **Methods:**

Oregon Health Plan (OHP) members were identified for inclusion based on paid FFS claims for a SABA inhaler (**Appendix 2, Table C, Inhaler formulations**). The evaluation window for SABA was from 7/1/21 to 6/30/22. The index event (IE) was defined as the first paid FFS claim for a SABA in the evaluation window. Demographics were evaluated at the time of the IE.

The following timeframes were used to evaluate outcomes and determine inclusion of members in the study:

- Baseline period: 6 months before the IE (exclusive of the IE)
- Follow-up period: 6 months after the IE (inclusive of the IE)

Members were categorized into groups by:

- Diagnoses present in medical claims in the 6 month baseline period. Diagnoses of interest included asthma and COPD (defined in **Appendix 2, Table J**).
- Presence or absence of an asthma controller medication in the 8 weeks before or after the IE. Asthma controller therapy is defined based on drugs in **Appendix 2 (Tables B, D, E, F, G, and I)**.

Inclusion Criteria:

1. At least one point-of-sale (POS) FFS paid claim for SABA inhaler during the evaluation window

Exclusion Criteria:

1. Individuals with benefit packages listed below. Certain benefit packages have limited or no drug benefits, and claims may be incomplete.

| Category                            | Benefit Package | Description   |
|-------------------------------------|-----------------|---|
| Medicare Part D coverage            | BMM             | Qualified Medicare Beneficiary + Oregon Health Plan with Limited Drug |
|                                     | BMD             | Oregon Health Plan with Limited Drug                                  |
|                                     | MED             | Qualified Medicare Beneficiary  |
| Limited or no Medicaid drug benefit | MND             | Transplant package  |
|                                     | CWM             | Citizenship Waived Emergency Medical                                  |
|                                     | SMF             | Special Low-Income Medicare Beneficiary Only                          |
|                                     | SMB             | Special Low-Income Medicare Beneficiary Only                          |

2. Non-continuous Medicaid eligibility during the baseline period
3. Non-continuous FFS eligibility during the follow-up period
4. Members with third-party liability during the baseline or follow-up period

Outcomes evaluated in this analysis included:

- Emergency department visit, hospitalization, or prescription for oral corticosteroid in the follow-up period (6 months). Codes for oral corticosteroids are defined in **Appendix 2, table H**.
- Number of SABA inhalers dispensed in the 6 month follow-up period, where inhalers are defined based on package size for a given NDC. Each HFA inhaler contains 200 doses. According to GINA 2023 SABA use of 3 or more 200 dose canisters in a year, corresponding to average use more than daily (1.6 doses/day) and increases risk of asthma exacerbations, and 12 or more canisters in a year increases risk of death. Since this study evaluated a shorter follow up period, we defined overuse as more than 2 inhalers over 6 months.
- Proportion of members with prescribed asthma controller therapy in the 8 weeks before or after the IE (inclusive of the IE). The total 16 week period was chosen to identify and include any members who were filling maintenance controller medication for a 90 day supply.
- Subgroups based on diagnoses or asthma severity were analyzed to determine if these outcomes varied by group. For patients with medical claims denoting more than one different asthma severities, members were categorized based on the more severe diagnosis and most specific diagnosis. For example, members with diagnoses of both mild intermittent and mild persistent asthma would be categorized as mild persistent. Members with diagnoses of both moderate persistent and other/unspecified asthma would be categorized as moderate persistent.
- Post-hoc assessment of most common medical diagnoses likely associated with SABA claim.

**Results:**

**Table 1** describes characteristics for patients prescribed SABA inhalers. Most patients were adult females assigned at birth of American Indian/Alaskan Native descent. Nearly 20% were children, and 3% were 5 years of age or younger. Asthma diagnosis was recorded in 24.6% of patients, while 75.4% of patients had no recorded diagnosis of asthma and only 5.2% of that group carried a COPD diagnosis.

**Table 1: Demographics Data of FFS members with Short-Acting Beta-Agonist Pharmacy Claims**

|  | 1,867 | %     |
|--|-------|-------|
| <b>Age groups based on GINA guidelines</b> |       |       |
| 5 years and younger                        | 56    | 3.0%  |
| 6 to 11 years                              | 110   | 5.9%  |
| 12 to 17 years                             | 206   | 11.0% |
| 18 years and older                         | 1,495 | 80.1% |
| <b>Sex</b>                                 |       |       |
| Female                                     | 1,211 | 64.9% |
| Male                                       | 656   | 35.1% |
| <b>Race</b>                                |       |       |
| White                                      | 436   | 23.4% |
| American Indian/Alaskan Native (HNA)       | 909   | 48.7% |
| Hispanic                                   | 96    | 5.1%  |
| Black                                      | 23    | 1.2%  |
| Unknown                                    | 398   | 21.3% |
| Other                                      | 5     | 0.3%  |
| <b>Asthma Type</b>                         |       |       |
| Asthma                                     | 459   | 24.6% |
| Mild intermittent asthma                   | 94    | 5.0%  |
| Mild persistent asthma                     | 41    | 2.2%  |
| Moderate persistent asthma                 | 87    | 4.7%  |
| Severe persistent asthma                   | 17    | 0.9%  |
| Other and unspecified asthma               | 220   | 11.8% |
| No Asthma diagnosis                        | 1,408 | 75.4% |
| COPD                                       | 97    | 5.2%  |

A total of 1,867 patients had at least 1 SABA claim in the follow-up period, 459 of these had a diagnosis of asthma and 125 a diagnosis of COPD (N=28 both asthma+COPD). Nearly half of patients with a SABA claim received only a single inhaler claim during the six month follow-up period. This varied by diagnosis and those with COPD were the most likely subgroup to fill claims for four or more inhalers and 24% received more than six SABA inhalers. Over half of patients with asthma filled 2 or more SABA inhalers in the 6 month time period, indicating possible daily use, while 17.0% (N=78) of patients with asthma filled 6 or more SABA inhalers in 6 months. Patients with neither asthma or COPD were most likely to only have a single SABA inhaler claim.

**Table 2: Number of SABA inhalers filled by individual members in a 6 month follow-up period**

|                           | All members with a SABA claim |       | Asthma Diagnosis |       | COPD Diagnosis |       | Neither Diagnosis |       |
|---------------------------|-------------------------------|-------|------------------|-------|----------------|-------|-------------------|-------|
|                           | 1,867                         | %     | 459              | %     | 125            | %     | 1,311             | %     |
| <b>Number of inhalers</b> |                               |       |                  |       |                |       |                   |       |
| 1                         | 877                           | 47.0% | 164              | 35.7% | 27             | 21.6% | 689               | 52.6% |
| 2                         | 373                           | 20.0% | 87               | 19.0% | 18             | 14.4% | 273               | 20.8% |
| 3                         | 200                           | 10.7% | 63               | 13.7% | 15             | 12.0% | 125               | 9.5%  |
| 4                         | 124                           | 6.6%  | 40               | 8.7%  | 14             | 11.2% | 73                | 5.6%  |
| 5                         | 77                            | 4.1%  | 27               | 5.9%  | 9              | 7.2%  | 44                | 3.4%  |
| 6                         | 79                            | 4.2%  | 31               | 6.8%  | 12             | 9.6%  | 40                | 3.1%  |
| >6                        | 137                           | 7.3%  | 47               | 10.2% | 30             | 24.0% | 67                | 5.1%  |

**Table 3** describes patients with SABA claims by diagnosis and concomitant medication therapy. SABA monotherapy was identified in 58.6% (N=269) of patients with asthma, 44% of patients with COPD (N=55), and 79.3% (N=1039) of patients without asthma or COPD.

**Table 3: Concomitant Controller Drugs by Indication**

|   | All members with a SABA claim |       | Asthma Diagnosis |       | COPD Diagnosis |       | Neither Diagnosis |       |
|---|-------------------------------|-------|------------------|-------|----------------|-------|-------------------|-------|
|   | 1,867                         | %     | 459              | %     | 125            | %     | 1,311             | %     |
| SABA only (monotherapy)                                 | 1,353                         | 72.5% | 269              | 58.6% | 55             | 44.0% | 1,039             | 79.3% |
| SABA + controller                                       | 514                           | 27.5% | 190              | 41.4% | 70             | 56.0% | 272               | 20.7% |
| SABA + Leukotriene only                                 | 56                            | 3.0%  | 18               | 3.9%  | 3              | 2.4%  | 36                | 2.7%  |
| SABA + ICS/ICS combo product +/- additional controllers | 452                           | 24.2% | 169              | 36.8% | 63             | 50.4% | 236               | 18.0% |
| SABA + anything else                                    | 110                           | 5.9%  | 49               | 10.7% | 22             | 17.6% | 48                | 3.7%  |

Pediatric and adolescent patients with SABA claims were more likely to only have 1-2 inhalers in 6 months compared to more than 2 inhalers. Adults made up the vast majority of patients with more than 2 inhaler claims (88.7%; N=547) compared to younger ages, and patients with comorbid COPD were also more likely to have more than 2 inhalers (13.0%; N=80) compared to 1-2 inhalers (3.6%; N=45). Those with an asthma diagnosis were most commonly classified as “other or unspecified asthma” (N=220) compared to other specific asthma severities. Most patients with severe persistent and moderate persistent asthma were more likely to have more than 2 inhaler claims compared to 1-2 inhaler claims (2.6%, N=16 vs. 0.1%, N=1 for severe; 8.8%, N=54 vs. 2.6%, N=33 for moderate). There were 51 children 5 years and younger with SABA monotherapy, and 8 of those children had greater than 2 inhalers. Similarly, 78 children 6 to 11 years had SABA monotherapy and 10 of those children received greater than 2 inhalers. Most people with SABA monotherapy were 12 years or older and 339 of them received more than 2 inhalers in the 6 month follow up period.

**Table 4: Short-Acting Beta-Agonist Overuse by Subgroup**

|  | Patients by count of SABA Inhalers in 6 month follow-up period |       |             |       |
|--|--|-------|-------------|-------|
|  | 1-2 Inhalers   |       | >2 Inhalers |       |
|  | 1,250  | %     | 617         | %     |
| <b>Age groups based on GINA guidelines</b> |  |       |             |       |
| 5 years and younger                        | 47   | 3.8%  | 9           | 1.5%  |
| 6 to 11 years                              | 91   | 7.3%  | 19          | 3.1%  |
| 12 to 17 years                             | 164  | 13.1% | 42          | 6.8%  |
| 18 years and older                         | 948  | 75.8% | 547         | 88.7% |
| <b>Asthma Severity</b>                     |  |       |             |       |
| Mild intermittent asthma                   | 61   | 4.9%  | 33          | 5.3%  |
| Mild persistent asthma                     | 22   | 1.8%  | 19          | 3.1%  |
| Moderate persistent asthma                 | 33   | 2.6%  | 54          | 8.8%  |
| Severe persistent asthma                   | 1  | 0.1%  | 16          | 2.6%  |
| Other and unspecified asthma               | 134  | 10.7% | 86          | 13.9% |
| <b>Comorbid COPD</b>                       | 45   | 3.6%  | 80          | 13.0% |
| <b>SABA Monotherapy</b>                    |  |       |             |       |
| 5 years and younger                        | 43   | 3.4%  | 8           | 1.3%  |
| 6 to 11 years                              | 68   | 5.4%  | 10          | 1.6%  |
| 12 years and older                         | 885  | 70.8% | 339         | 54.9% |



Oral corticosteroid use appeared highest for members with claims for 2 to 5 inhalers (19.3%; N=149) and more than 5 inhalers (28.7%; N=62). The rate of emergency room visits was also highest in those with more than 5 inhalers compared to the other subgroups (**Table 5**). Hospitalization rates were similar among subgroups, while deaths were almost twice as common in members receiving 2 to 5 inhalers (2.2%, N=17) or more than 5 inhalers (2.3%; N=5) compared to all members with SABA prescriptions (1.5%; N=28) and SABA monotherapy (1.2%; N=16).

**Table 5: Short-Acting Beta-Agonist Overuse and Adverse Events in the follow-up period**

|  | ALL members with SABA Rx |       | Members with SABA monotherapy |       | Members with SABA claims indicating 2-5 inhalers in 6 months |       | Members with SABA claims indicating >5 inhalers in 6 months |       |
|--|--------------------------|-------|-------------------------------|-------|--|-------|---|-------|
|  | 1,867                    | %     | 1,353                         | %     | 774  | %     | 216   | %     |
| Members with claims for oral corticosteroids | 343                      | 18.4% | 221                           | 16.3% | 149  | 19.3% | 62  | 28.7% |
| Members with emergency room visits           | 604                      | 32.4% | 439                           | 32.4% | 257  | 33.2% | 82  | 38.0% |
| Members with hospitalizations                | 115                      | 6.2%  | 79                            | 5.8%  | 54   | 7.0%  | 15  | 6.9%  |
| Death  | 28                       | 1.5%  | 16                            | 1.2%  | 17   | 2.2%  | 5   | 2.3%  |

**Table 6** represents a post-hoc analysis of the 1311 (70.2%) patients with SABA claims but without a diagnosis of asthma or COPD. Patients may have more than one or zero of the ICD 10 codes of interest. These patients were most likely to only have claims for 1 (52.6%, N=689) or 2 (20.8%, N=273) inhalers in the 6 month follow up period, though 242 patients (18.5%) had claims for 3-5 inhalers and 107 patients (8.2%) had claims for 6 or more inhalers. Cough (13.6%, N=178), nicotine dependence (12.7%, N=167), and abnormalities of breathing (11.6%, N=152) were these most common diagnoses listed in these patients. Various types of acute respiratory infections such as upper respiratory tract infections, acute pharyngitis, and viral illnesses were identified in this list.

| <b>Table 6: Top 50 Selected ICD Codes of Interest for Patient with neither a diagnosis for Asthma or COPD in six months prior to IE</b> |   |              |  |            |                  |            |                   |            |                     |            |                        |  |
|---|---|--------------|--|------------|------------------|------------|-------------------|------------|---------------------|------------|------------------------|--|
| <b>Grouped by first 3 digits of ICD-10 code</b>   |   |              | <b>Members with Neither Asthma or COPD Diagnosis</b> |            |                  |            |                   |            |                     |            |                        |  |
|   |   |              | <b>Any number of Inhalers</b>                        |            | <b>1 Inhaler</b> |            | <b>2 Inhalers</b> |            | <b>3-5 Inhalers</b> |            | <b>&gt;=6 Inhalers</b> |  |
| <b>ICD</b>  | <b>Description</b>  | <b>1,311</b> | <b>%</b>   | <b>689</b> | <b>%</b>         | <b>273</b> | <b>%</b>          | <b>242</b> | <b>%</b>            | <b>107</b> | <b>%</b>               |  |
| R05   | Cough   | 178          | 13.6%  | 109        | 15.8%            | 41         | 15.0%             | 21         | 8.7%                | 7          | 6.5%                   |  |
| F17   | Nicotine dependence                                       | 167          | 12.7%  | 93         | 13.5%            | 24         | 8.8%              | 37         | 15.3%               | 13         | 12.1%                  |  |
| R06   | Abnormalities of breathing                                | 152          | 11.6%  | 85         | 12.3%            | 27         | 9.9%              | 29         | 12.0%               | 11         | 10.3%                  |  |
| U07   | Emergency use of U07                                      | 108          | 8.2%   | 64         | 9.3%             | 19         | 7.0%              | 17         | 7.0%                | 8          | 7.5%                   |  |
| J06   | Acute upper resp infections of multiple and unsp sites    | 90           | 6.9%   | 57         | 8.3%             | 16         | 5.9%              | 16         | 6.6%                | 1          | 0.9%                   |  |
| J02   | Acute pharyngitis   | 85           | 6.5%   | 53         | 7.7%             | 18         | 6.6%              | 11         | 4.5%                | 3          | 2.8%                   |  |
| R53   | Malaise and fatigue                                       | 83           | 6.3%   | 47         | 6.8%             | 15         | 5.5%              | 17         | 7.0%                | 4          | 3.7%                   |  |
| G47   | Sleep disorders   | 75           | 5.7%   | 34         | 4.9%             | 11         | 4.0%              | 23         | 9.5%                | 7          | 6.5%                   |  |
| R09   | Oth symptoms and signs involving the circ and resp sys    | 75           | 5.7%   | 47         | 6.8%             | 14         | 5.1%              | 13         | 5.4%                | 1          | 0.9%                   |  |
| J30   | Vasomotor and allergic rhinitis                           | 49           | 3.7%   | 24         | 3.5%             | 10         | 3.7%              | 11         | 4.5%                | 4          | 3.7%                   |  |
| Z72   | Problems related to lifestyle                             | 43           | 3.3%   | 21         | 3.0%             | 4          | 1.5%              | 13         | 5.4%                | 5          | 4.7%                   |  |
| J01   | Acute sinusitis   | 36           | 2.7%   | 18         | 2.6%             | 6          | 2.2%              | 11         | 4.5%                | 1          | 0.9%                   |  |
| R91   | Abnormal findings on diagnostic imaging of lung           | 36           | 2.7%   | 20         | 2.9%             | 5          | 1.8%              | 5          | 2.1%                | 6          | 5.6%                   |  |
| J98   | Other respiratory disorders                               | 28           | 2.1%   | 12         | 1.7%             | 6          | 2.2%              | 6          | 2.5%                | 4          | 3.7%                   |  |
| J03   | Acute tonsillitis   | 26           | 2.0%   | 17         | 2.5%             | 5          | 1.8%              | 3          | 1.2%                | 1          | 0.9%                   |  |
| B34   | Viral infection of unspecified site                       | 25           | 1.9%   | 17         | 2.5%             | 7          | 2.6%              | 1          | 0.4%                | 0          | 0.0%                   |  |
| J18   | Pneumonia, unspecified organism                           | 22           | 1.7%   | 13         | 1.9%             | 3          | 1.1%              | 6          | 2.5%                | 0          | 0.0%                   |  |
| Z86   | Personal history of certain other diseases                | 20           | 1.5%   | 9          | 1.3%             | 6          | 2.2%              | 5          | 2.1%                | 0          | 0.0%                   |  |
| J96   | Respiratory failure, not elsewhere classified             | 19           | 1.4%   | 9          | 1.3%             | 1          | 0.4%              | 7          | 2.9%                | 2          | 1.9%                   |  |
| J34   | Other and unspecified disorders of nose and nasal sinuses | 15           | 1.1%   | 9          | 1.3%             | 2          | 0.7%              | 3          | 1.2%                | 1          | 0.9%                   |  |
| J12   | Viral pneumonia, not elsewhere classified                 | 14           | 1.1%   | 10         | 1.5%             |            | 0.0%              | 2          | 0.8%                | 2          | 1.9%                   |  |
| J32   | Chronic sinusitis   | 14           | 1.1%   | 9          | 1.3%             | 2          | 0.7%              | 1          | 0.4%                | 2          | 1.9%                   |  |
| J20   | Acute bronchitis  | 13           | 1.0%   | 5          | 0.7%             | 3          | 1.1%              | 4          | 1.7%                | 1          | 0.9%                   |  |
| J40   | Bronchitis, not specified as acute or chronic             | 9            | 0.7%   | 5          | 0.7%             | 2          | 0.7%              | 1          | 0.4%                | 1          | 0.9%                   |  |
| J43   | Emphysema   | 8            | 0.6%   | 4          | 0.6%             | 1          | 0.4%              | 2          | 0.8%                | 1          | 0.9%                   |  |
| J00   | Acute nasopharyngitis [common cold]                       | 6            | 0.5%   | 4          | 0.6%             | 1          | 0.4%              | 1          | 0.4%                | 0          | 0.0%                   |  |

|     |  |              |               |            |               |            |              |            |               |           |              |
|-----|--|--------------|---------------|------------|---------------|------------|--------------|------------|---------------|-----------|--------------|
| J38 | Diseases of vocal cords and larynx, not elsewhere classified | 5            | 0.4%          | 3          | 0.4%          |            | 0.0%         | 2          | 0.8%          | 0         | 0.0%         |
| J81 | Pulmonary edema  | 5            | 0.4%          | 3          | 0.4%          | 1          | 0.4%         | 0          | 0.0%          | 1         | 0.9%         |
| J84 | Other interstitial pulmonary diseases                        | 5            | 0.4%          | 3          | 0.4%          | 1          | 0.4%         | 0          | 0.0%          | 1         | 0.9%         |
| J31 | Chronic rhinitis, nasopharyngitis and pharyngitis            | 5            | 0.4%          | 3          | 0.4%          |            | 0.0%         | 2          | 0.8%          | 0         | 0.0%         |
| J90 | Pleural effusion, not elsewhere classified                   | 4            | 0.3%          | 2          | 0.3%          | 1          | 0.4%         | 1          | 0.4%          | 0         | 0.0%         |
| J21 | Acute bronchiolitis  | 3            | 0.2%          | 3          | 0.4%          |            | 0.0%         | 0          | 0.0%          | 0         | 0.0%         |
| J42 | Unspecified chronic bronchitis                               | 3            | 0.2%          | 1          | 0.1%          | 1          | 0.4%         | 1          | 0.4%          | 0         | 0.0%         |
| J80 | Acute respiratory distress syndrome                          | 3            | 0.2%          | 1          | 0.1%          | 1          | 0.4%         | 1          | 0.4%          | 0         | 0.0%         |
| J33 | Nasal polyp  | 2            | 0.2%          |            | 0.0%          |            | 0.0%         | 1          | 0.4%          | 1         | 0.9%         |
| U09 | Post COVID-19 condition                                      | 2            | 0.2%          | 2          | 0.3%          |            | 0.0%         | 0          | 0.0%          | 0         | 0.0%         |
| J93 | Pneumothorax and air leak                                    | 2            | 0.2%          | 2          | 0.3%          |            | 0.0%         | 0          | 0.0%          | 0         | 0.0%         |
| J41 | Simple and mucopurulent chronic bronchitis                   | 2            | 0.2%          | 1          | 0.1%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
| J35 | Chronic diseases of tonsils and adenoids                     | 2            | 0.2%          | 1          | 0.1%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
| J15 | Bacterial pneumonia, not elsewhere classified                | 2            | 0.2%          | 1          | 0.1%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
| J11 | Influenza due to unidentified influenza virus                | 2            | 0.2%          | 2          | 0.3%          |            | 0.0%         | 0          | 0.0%          | 0         | 0.0%         |
| J05 | Acute obstructive laryngitis [croup] and epiglottitis        | 2            | 0.2%          |            | 0.0%          | 1          | 0.4%         | 1          | 0.4%          | 0         | 0.0%         |
| J36 | Peritonsillar abscess  | 2            | 0.2%          | 1          | 0.1%          | 1          | 0.4%         | 0          | 0.0%          | 0         | 0.0%         |
| J95 | Intraop and postproc comp and disorders of resp sys, NEC     | 1            | 0.1%          |            | 0.0%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
| E84 | Cystic fibrosis  | 1            | 0.1%          |            | 0.0%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
| J04 | Acute laryngitis and tracheitis                              | 1            | 0.1%          |            | 0.0%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
| J22 | Unspecified acute lower respiratory infection                | 1            | 0.1%          | 1          | 0.1%          |            | 0.0%         | 0          | 0.0%          | 0         | 0.0%         |
| J37 | Chronic laryngitis and laryngotracheitis                     | 1            | 0.1%          |            | 0.0%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
| J39 | Other diseases of upper respiratory tract                    | 1            | 0.1%          |            | 0.0%          | 1          | 0.4%         | 0          | 0.0%          | 0         | 0.0%         |
| J47 | Bronchiectasis   | 1            | 0.1%          |            | 0.0%          |            | 0.0%         | 0          | 0.0%          | 1         | 0.9%         |
| J69 | Pneumonitis due to solids and liquids                        | 1            | 0.1%          |            | 0.0%          |            | 0.0%         | 1          | 0.4%          | 0         | 0.0%         |
|     |  |              |               |            |               |            |              |            |               |           |              |
|     | <b>Total:</b>  | <b>1,455</b> | <b>111.0%</b> | <b>825</b> | <b>119.7%</b> | <b>257</b> | <b>94.1%</b> | <b>283</b> | <b>116.9%</b> | <b>90</b> | <b>84.1%</b> |

**Limitations:**

- This study evaluates a short point in time. Prescription claims data are subject to inherent limitations based on the design and may not accurately reflect true medication use. For albuterol, duplicate claims with the intent to store the medication at multiple locations (e.g. home and school) cannot be ascertained.
- Asthma has multiple diagnosis codes with varying severity and condition may wax and wane seasonally and in response to medication adherence.
- Those with more severe asthma may be more likely to have extra inhalers at multiple locations to ensure access, while also more likely to have adverse outcomes due to disease severity.
- Medical claims data and diagnosis codes may be incomplete. Post-hoc analysis of potential indications for SABA use in patients without asthma or COPD diagnoses must be interpreted with caution and is not all-inclusive.
- Inclusion criteria limited ability to follow patients for full year to describe high SABA use as defined by GINA.
- Inclusion limited SABA of interest to inhaler formulations; individuals relying on nebulizer formulations are not reflected.
- A significant portion of patients were excluded based on Medicare and TPL eligibility, and Medicaid eligibility requirements (**Table 7**).
- Timing of evaluation window likely captured most first claims in fall. Seasonal differences such as wildfire smoke in fall and pollen in spring may affect claims.
- Given high rate of non-asthma diagnoses and differences in number of inhalers seen in subgroups with and without asthma or COPD, the outcome groups compared in **Table 5** are likely fundamentally different patient populations.

**Table 7. Population of included patients****Number of included patients**

---

|   |              |
|---|--------------|
| Members with FFS paid claims for a SABA                 | 5,846        |
| After exclusion of Medicare and TPL                     | 3,222        |
| After 6 month baseline Medicaid eligibility requirement | 2,427        |
| After 6 month follow-up FFS eligibility requirement     | <b>1,867</b> |

---

**References:**

1. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2023. Updated May 2023. Available from: [www.ginasthma.org](http://www.ginasthma.org). Accessed June 8, 2023.
2. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention, 2021. Available from: [www.ginasthma.org](http://www.ginasthma.org). Accessed June 8, 2023.
3. Chipps BE, Murphy KR, Oppenheimer J. 2020 NAEPP Guidelines Update and GINA 2021-Asthma Care Differences, Overlap, and Challenges. *J Allergy Clin Immunol Pract*. 2022;10(1S):S19-S30.
4. Agusti A, Celli BR, Criner GJ, et al. Global Initiative for Chronic Obstructive Lung Disease 2023 Report: GOLD Executive Summary. *Am J Respir Crit Care Med*. 2023;207(7):819-837.

**Short-Acting Beta Agonist Inhaler-Quantity Limit**

**Goal(s):**

- Restrict use of short-acting beta agonist inhalers (SABA) inhalers to reduce overuse and risk of harmful outcomes as supported by medical literature for patients with asthma.

**Length of Authorization:**

- Up to 12 months

**Requires PA:**

- Any SABA claim for more than 6 claims in 6 months.
- Auto-PA patients with chronic obstructive pulmonary disease (COPD) and certain asthma controller medications.

**Covered Alternatives:**

- Current PMPDP preferred drug list per OAR 410-121-0030 at [www.orpdl.org](http://www.orpdl.org)
- Searchable site for Oregon FFS Drug Class listed at [www.orpdl.org/drugs/](http://www.orpdl.org/drugs/)

| Approval Criteria   |                                   |  |
|---|-----------------------------------|--|
| 1. What diagnosis is being treated?   | Record ICD10 code                 |  |
| 2. Does the patient have a diagnosis of COPD?   | <b>Yes:</b> Approve for 12 months | <b>No:</b> Go to #3                                    |
| 3. Does the patient have a diagnosis of asthma?   | <b>Yes:</b> Go to #4              | <b>No:</b> Go to #5                                    |
| 4. Does prescriber agree to add a controller therapy or discuss adherence with patient for prescribed controller?<br>Inform prescriber of preferred agents in classes.<br><br>Note: Inhaled corticosteroids are preferred controller for most patients with asthma. Combinations with long-acting beta agonists, inhaled muscarinics, leukotriene modifiers, or biologic agents may be appropriate for some patients with asthma or COPD. | <b>Yes:</b> Approve for 6 months  | <b>No:</b> Pass to RPh. Deny; medical appropriateness. |

| Approval Criteria  |   |  |
|--|---|--|
| 5. Is the request from a pulmonary or allergy specialist?      | <b>Yes:</b> Approve for 12 months   | <b>No:</b> Go to #6                                    |
| 6. Is the request for a single inhaler for an acute condition? | <b>Yes:</b> Approve single inhaler.<br><br>Chronic use requires a specialist or diagnosis of asthma or COPD with concomitant use of a guideline directed controller medication. | <b>No:</b> Pass to RPh. Deny; medical appropriateness. |

P&T / DUR Review: 10/23 (SF)  
 Implementation: TBD

## Long-acting Beta-agonists (LABA)

### Goals:

- To optimize the safe and effective use of LABA therapy in patients with asthma and COPD.

### Length of Authorization:

- Up to 12 months

### Requires PA:

- Non-preferred LABA products

### Covered Alternatives:

- Current PMPDP preferred drug list per OAR 410-121-0030 at [www.orpdl.org](http://www.orpdl.org)
- Searchable site for Oregon FFS Drug Class listed at [www.orpdl.org/drugs/](http://www.orpdl.org/drugs/)

| <b>Approval Criteria</b>  |  |  |
|---|--|--|
| 1. What diagnosis is being treated?   | Record ICD10 Code  |  |
| 2. Will the prescriber consider a change to a preferred product?<br><br><u>Message:</u> <ul style="list-style-type: none"> <li>• Preferred products are reviewed for comparative effectiveness and safety by the Oregon Pharmacy and Therapeutics (P&amp;T) Committee.</li> </ul> | <b>Yes:</b> Inform prescriber of covered alternatives in class | <b>No:</b> Go to #3  |
| 3. Does the patient have a diagnosis of asthma or reactive airway disease?  | <b>Yes:</b> Go to #5   | <b>No:</b> Go to #4  |
| 4. Does the patient have a diagnosis of COPD, mucopurulent chronic bronchitis and/or emphysema?   | <b>Yes:</b> Approve for up to 12 months                        | <b>No:</b> Pass to RPh. Deny; medical appropriateness.<br><br>Need a supporting diagnosis. If prescriber believes diagnosis is appropriate, inform prescriber of the appeals process for Medical Director Review. Chronic bronchitis is unfunded |
| 5. Does the patient have an active prescription for an inhaled corticosteroid (ICS) or an alternative asthma controller medication?   | <b>Yes:</b> Approve for up to 12 months                        | <b>No:</b> Pass to RPh. Deny; medical appropriateness  |

P&T/DUR Review: 10/23 (SF); 10/22 (KS), 10/20 (KS), 5/19 (KS); 1/18; 9/16; 9/15); 5/12; 9/09; 5/09



## Long-acting Muscarinic Antagonist/Long-acting Beta-agonist (LAMA/LABA) and LAMA/LABA/Inhaled Corticosteroid (LAMA/LABA/ICS) Combinations

### **Goals:**

- To optimize the safe and effective use of LAMA/LABA/ICS therapy in patients with asthma and COPD.
- Step-therapy required prior to coverage:
  - Asthma and COPD: short-acting bronchodilator and previous trial of two drug combination therapy (ICS/LABA, LABA/LAMA or ICS/LAMA). Preferred monotherapy inhaler LAMA and LABA products do NOT require prior authorization.

### **Length of Authorization:**

- Up to 12 months

### **Requires PA:**

- All LAMA/LABA and LAMA/LABA/ICS products

### **Covered Alternatives:**

- Current PMPDP preferred drug list per OAR 410-121-0030 at [www.orpdl.org](http://www.orpdl.org)
- Searchable site for Oregon FFS Drug Class listed at [www.orpdl.org/drugs/](http://www.orpdl.org/drugs/)

### **Approval Criteria**

1. What diagnosis is being treated?

Record ICD10 Code

## Approval Criteria

|  |   |  |
|--|---|--|
| <p>2. Will the prescriber consider a change to a preferred product?</p> <p><u>Message:</u></p> <ul style="list-style-type: none"> <li>Preferred products are reviewed for comparative effectiveness and safety by the Oregon Pharmacy and Therapeutics (P&amp;T) Committee.</li> </ul> | <p><b>Yes:</b> Inform prescriber of preferred LAMA and LABA products in each class</p>  | <p><b>No:</b> Go to #3</p>   |
| <p>3. Does the patient have a diagnosis of asthma or reactive airway disease without COPD?</p>   | <p><b>Yes:</b> Go to #8</p>   | <p><b>No:</b> Go to #4</p>   |
| <p>4. Does the patient have a diagnosis of COPD, mucopurulent chronic bronchitis and/or emphysema?</p>   | <p><b>Yes:</b> Go to #5</p>   | <p><b>No:</b> Pass to RPh. Deny; medical appropriateness.</p> <p>Need a supporting diagnosis. If prescriber believes diagnosis is appropriate, inform prescriber of the appeals process for Medical Director Review. Chronic bronchitis is unfunded.</p> |
| <p>5. Is the request for a LAMA/LABA combination product?</p>  | <p><b>Yes:</b> Approve for up to 12 months. Stop coverage of all other LAMA and LABA inhalers or scheduled SAMA/SABA inhalers (PRN SABA or SAMA permitted).</p> | <p><b>No:</b> Go to #6</p>   |
| <p>6. Is the request for a 3 drug ICS/LABA/LAMA combination product and is there a documented trial of a LAMA and LABA, or ICS and LABA or ICS and LAMA?</p>   | <p><b>Yes:</b> Go to #7</p>   | <p><b>No:</b> Pass to RPh. Deny; medical appropriateness.</p>  |

| Approval Criteria  |   |  |
|--|---|--|
| 7. Is there documentation that the prescriber is willing to stop coverage of all other LAMA, LABA, and ICS inhaler combination products? | <b>Yes:</b> Approve for up to 12 months. Stop coverage of all other LAMA, LABA and ICS inhalers.  | <b>No:</b> Pass to RPh. Deny; medical appropriateness. |
| 8. Does the patient have an active prescription for an on-demand short-acting acting beta-agonist (SABA) and/or for ICS-formoterol?      | <b>Yes:</b> Go to #9  | <b>No:</b> Pass to RPh. Deny; medical appropriateness. |
| 9. Is the request for Trelegy Ellipta (ICS/LAMA/LABA) combination product and is there a documented trial of an ICS/LABA?                | <b>Yes:</b> Approve for up to 12 months. Stop coverage of all other LAMA, LABA and ICS inhalers (with the exception of ICS-formoterol which may be continued) | <b>No:</b> Pass to RPh. Deny; medical appropriateness. |

P&T Review: 10/23 (SF); 10/22 (KS), 10/21 (SF); 12/20 (KS), 10/20, 5/19; 1/18; 9/16; 11/15; 9/15; 11/14; 11/13; 5/12; 9/09; 2/06

Implementation: 1/1/21; 3/1/18; 10/13/16; 1/1/16; 1/15; 1/14; 9/12; 1/10

## Inhaled Corticosteroids (ICS)

### Goals:

- To optimize the safe and effective use of ICS therapy in patients with asthma and COPD.

### Length of Authorization:

- Up to 12 months

### Requires PA:

- Non-preferred ICS products

**Covered Alternatives:**

- Current PMPDP preferred drug list per OAR 410-121-0030 at [www.orpdl.org](http://www.orpdl.org)
- Searchable site for Oregon FFS Drug Class listed at [www.orpdl.org/drugs/](http://www.orpdl.org/drugs/)

| <b>Approval Criteria</b>   |   |   |
|--|---|---|
| 1. What diagnosis is being treated?  | Record ICD10 Code   |   |
| 2. Will the prescriber consider a change to a preferred product?<br><br><u>Message:</u><br><br>Preferred products are reviewed for comparative effectiveness and safety by the Oregon Pharmacy and Therapeutics (P&T) Committee. | <b>Yes:</b> Inform prescriber of covered alternatives in class. | <b>No:</b> Go to #3   |
| 3. Is the request for treatment of asthma or reactive airway disease?  | <b>Yes:</b> Go to #6  | <b>No:</b> Go to #4   |
| 4. Is the request for treatment of COPD, mucopurulent chronic bronchitis and/or emphysema?   | <b>Yes:</b> Go to #5  | <b>No:</b> Pass to RPh. Deny; medical appropriateness.<br><br>Need a supporting diagnosis. If prescriber believes diagnosis is appropriate, inform prescriber of the appeals process for Medical Director Review. Chronic bronchitis is unfunded. |

## Approval Criteria

|   |   |  |
|---|---|--|
| 5. Does the patient have an active prescription for an inhaled long-acting bronchodilator (anticholinergic or beta-agonist)?  | <b>Yes:</b> Approve for up to 12 months | <b>No:</b> Pass to RPh. Deny; medical appropriateness. |
| 6. Does the patient have an active prescription for an on-demand short-acting beta-agonist (SABA) or an alternative rescue medication for acute asthma exacerbations? | <b>Yes:</b> Approve for up to 12 months | <b>No:</b> Pass to RPh. Deny; medical appropriateness  |

P&T/DUR Review: 10/23 (SF); 10/22 (KS), 10/20 (KS), 5/19 (KS), 1/18; 9/16; 9/15

Implementation: 3/1/18; 10/13/16; 10/9/15

### Appendix 2: Drug classes and ICD 10 coding

Table A. Anticholinergic Inhalers

| HIC3 | HSN    | GSN    | RouteDesc  | FormDesc   | Brand                   | Generic                        | PDL |
|------|--------|--------|------------|------------|-------------------------|--------------------------------|-----|
| B60  | 000057 | 021700 | INHALATION | SOLUTION   | IPRATROPIUM BROMIDE     | ipratropium bromide            | Y   |
| B60  | 000057 | 021700 | INHALATION | SOLUTION   | IPRATROPIUM BROMIDE     | ipratropium bromide            | Y   |
| B60  | 000057 | 059081 | INHALATION | HFA AER AD | ATROVENT HFA            | ipratropium bromide            | Y   |
| B60  | 000057 | 059081 | INHALATION | HFA AER AD | ATROVENT HFA            | ipratropium bromide            | Y   |
| B61  | 024024 | 050714 | INHALATION | CAP W/DEV  | SPIRIVA HANDIHALER      | tiotropium bromide             | Y   |
| B61  | 024024 | 063164 | INHALATION | MIST INHAL | SPIRIVA RESPIMAT        | tiotropium bromide             | Y   |
| B61  | 024024 | 074813 | INHALATION | MIST INHAL | SPIRIVA RESPIMAT        | tiotropium bromide             | Y   |
| B61  | 039528 | 069855 | INHALATION | AER POW BA | TUDORZA PRESSAIR        | aclidinium bromide             | N   |
| B61  | 041115 | 072375 | INHALATION | BLST W/DEV | INCRUSE ELLIPTA         | umeclidinium bromide           | Y   |
| B61  | 044687 | 078007 | INHALATION | VIAL-NEB   | LONHALA MAGNAIR STARTER | glycopyrrol/nebulizer/accessor | N   |
| B61  | 044691 | 078010 | INHALATION | VIAL-NEB   | LONHALA MAGNAIR REFILL  | glycopyrrolate/neb.accessories | N   |
| B61  | 045477 | 079272 | INHALATION | VIAL-NEB   | YUPELRI                 | revefenacin                    | N   |
| B62  | 009040 | 048018 | INHALATION | AMPUL-NEB  | DUONEB                  | ipratropium/albuterol sulfate  | Y   |
| B62  | 009040 | 048018 | INHALATION | AMPUL-NEB  | IPRATROPIUM-ALBUTEROL   | ipratropium/albuterol sulfate  | Y   |

|     |        |        |            |            |                       |                               |   |
|-----|--------|--------|------------|------------|-----------------------|-------------------------------|---|
| B62 | 009040 | 048018 | INHALATION | AMPUL-NEB  | IPRATROPIUM-ALBUTEROL | ipratropium/albuterol sulfate | Y |
| B62 | 009040 | 069371 | INHALATION | MIST INHAL | COMBIVENT RESPIMAT    | ipratropium/albuterol sulfate | Y |

Table B. Long-Acting Beta Agonists

| HIC3 | HSN    | GSN    | RouteDesc  | FormDesc   | Brand                 | Generic               | PDL |
|------|--------|--------|------------|------------|-----------------------|-----------------------|-----|
| B6Y  | 007393 | 031417 | INHALATION | BLST W/DEV | SEREVENT DISKUS       | salmeterol xinafoate  | Y   |
| B6Y  | 010747 | 063016 | INHALATION | VIAL-NEB   | FORMOTEROL FUMARATE   | formoterol fumarate   | N   |
| B6Y  | 010747 | 063016 | INHALATION | VIAL-NEB   | FORMOTEROL FUMARATE   | formoterol fumarate   | N   |
| B6Y  | 010747 | 063016 | INHALATION | VIAL-NEB   | PERFOROMIST           | formoterol fumarate   | N   |
| B6Y  | 034087 | 061579 | INHALATION | VIAL-NEB   | ARFORMOTEROL TARTRATE | arformoterol tartrate | N   |
| B6Y  | 034087 | 061579 | INHALATION | VIAL-NEB   | BROVANA               | arformoterol tartrate | N   |
| B6Z  | 040969 | 072077 | INHALATION | MIST INHAL | STRIVERDI RESPIMAT    | olodaterol HCl        | N   |

Table C. Short Acting Beta Agonists

| HIC3 | HSN    | GSN    | RouteDesc  | FormDesc   | Brand                 | Generic                | PDL |
|------|--------|--------|------------|------------|-----------------------|------------------------|-----|
| B6W  | 002058 | 004964 | INHALATION | SOLUTION   | ALUPENT               | metaproterenol sulfate | N   |
| B6W  | 002058 | 016033 | INHALATION | AER W/ADAP | ALUPENT               | metaproterenol sulfate | N   |
| B6W  | 002073 | 005039 | INHALATION | VIAL-NEB   | AIRET                 | albuterol sulfate      | Y   |
| B6W  | 002073 | 005039 | INHALATION | VIAL-NEB   | ALBUTEROL SULFATE     | albuterol sulfate      | Y   |
| B6W  | 002073 | 005039 | INHALATION | VIAL-NEB   | ALBUTEROL SULFATE     | albuterol sulfate      | Y   |
| B6W  | 002073 | 005040 | INHALATION | SOLUTION   | ALBUTEROL SULFATE     | albuterol sulfate      | Y   |
| B6W  | 002073 | 005040 | INHALATION | SOLUTION   | ALBUTEROL SULFATE     | albuterol sulfate      | Y   |
| B6W  | 002073 | 005040 | INHALATION | SOLUTION   | PROVENTIL             | albuterol sulfate      | Y   |
| B6W  | 002073 | 005040 | INHALATION | SOLUTION   | VENTOLIN              | albuterol sulfate      | Y   |
| B6W  | 002073 | 028090 | INHALATION | HFA AER AD | ALBUTEROL SULFATE HFA | albuterol sulfate      | Y   |
| B6W  | 002073 | 028090 | INHALATION | HFA AER AD | ALBUTEROL SULFATE HFA | albuterol sulfate      | Y   |
| B6W  | 002073 | 028090 | INHALATION | HFA AER AD | PROAIR HFA            | albuterol sulfate      | Y   |
| B6W  | 002073 | 028090 | INHALATION | HFA AER AD | PROAIR HFA            | albuterol sulfate      | Y   |

|     |        |        |            |            |                           |                       |   |
|-----|--------|--------|------------|------------|---------------------------|-----------------------|---|
| B6W | 002073 | 028090 | INHALATION | HFA AER AD | PROVENTIL HFA             | albuterol sulfate     | Y |
| B6W | 002073 | 028090 | INHALATION | HFA AER AD | PROVENTIL HFA             | albuterol sulfate     | Y |
| B6W | 002073 | 028090 | INHALATION | HFA AER AD | VENTOLIN HFA              | albuterol sulfate     | Y |
| B6W | 002073 | 028090 | INHALATION | HFA AER AD | VENTOLIN HFA              | albuterol sulfate     | Y |
| B6W | 002073 | 048698 | INHALATION | VIAL-NEB   | ALBUTEROL SULFATE         | albuterol sulfate     | Y |
| B6W | 002073 | 048699 | INHALATION | VIAL-NEB   | ALBUTEROL SULFATE         | albuterol sulfate     | Y |
| B6W | 002073 | 054687 | INHALATION | VIAL-NEB   | ALBUTEROL SULFATE         | albuterol sulfate     | Y |
| B6W | 002073 | 054687 | INHALATION | VIAL-NEB   | ALBUTEROL SULFATE         | albuterol sulfate     | Y |
| B6W | 002073 | 073806 | INHALATION | AER POW BA | PROAIR RESPICLICK         | albuterol sulfate     | N |
| B6W | 002073 | 080260 | INHALATION | AER PW BAS | PROAIR DIGIHALER          | albuterol sulfate     | N |
| B6W | 002074 | 005037 | INHALATION | AEROSOL    | PROVENTIL                 | albuterol             | N |
| B6W | 002074 | 005037 | INHALATION | AEROSOL    | VENTOLIN                  | albuterol             | N |
| B6W | 002074 | 005038 | INHALATION | AER REFILL | ALBUTEROL                 | albuterol             | N |
| B6W | 019858 | 041848 | INHALATION | VIAL-NEB   | LEVALBUTEROL HCL          | levalbuterol HCl      | N |
| B6W | 019858 | 041848 | INHALATION | VIAL-NEB   | LEVALBUTEROL HCL          | levalbuterol HCl      | N |
| B6W | 019858 | 041848 | INHALATION | VIAL-NEB   | XOPENEX                   | levalbuterol HCl      | N |
| B6W | 019858 | 041848 | INHALATION | VIAL-NEB   | XOPENEX                   | levalbuterol HCl      | N |
| B6W | 019858 | 041849 | INHALATION | VIAL-NEB   | LEVALBUTEROL HCL          | levalbuterol HCl      | N |
| B6W | 019858 | 041849 | INHALATION | VIAL-NEB   | XOPENEX                   | levalbuterol HCl      | N |
| B6W | 019858 | 049871 | INHALATION | VIAL-NEB   | LEVALBUTEROL HCL          | levalbuterol HCl      | N |
| B6W | 019858 | 049871 | INHALATION | VIAL-NEB   | XOPENEX                   | levalbuterol HCl      | N |
| B6W | 019858 | 057879 | INHALATION | VIAL-NEB   | LEVALBUTEROL CONCENTRATE  | levalbuterol HCl      | N |
| B6W | 019858 | 057879 | INHALATION | VIAL-NEB   | XOPENEX CONCENTRATE       | levalbuterol HCl      | N |
| B6W | 032814 | 058890 | INHALATION | HFA AER AD | LEVALBUTEROL TARTRATE HFA | levalbuterol tartrate | N |
| B6W | 032814 | 058890 | INHALATION | HFA AER AD | LEVALBUTEROL TARTRATE HFA | levalbuterol tartrate | N |
| B6W | 032814 | 058890 | INHALATION | HFA AER AD | XOPENEX HFA               | levalbuterol tartrate | N |

Note: Only highlighted agents are inhaler formulations

Table D. Combination Inhalers: Long-acting muscarinic, Long Acting Beta Agonist, and/or Inhaled Corticosteroids

| HIC3 | HSN | GSN | RouteDesc | FormDesc | Brand | Generic | PDL |
|------|-----|-----|-----------|----------|-------|---------|-----|
|------|-----|-----|-----------|----------|-------|---------|-----|

|     |        |        |            |            |                    |                                |   |
|-----|--------|--------|------------|------------|--------------------|--------------------------------|---|
| B62 | 040852 | 071883 | INHALATION | BLST W/DEV | ANORO ELLIPTA      | umeclidinium brm/vilanterol tr | Y |
| B62 | 041692 | 073344 | INHALATION | AER POW BA | DUAKLIR PRESSAIR   | acridinium brom/formoterol fum | N |
| B62 | 042048 | 074131 | INHALATION | MIST INHAL | STIOLTO RESPIMAT   | tiotropium Br/olodaterol HCl   | Y |
| B62 | 043352 | 075984 | INHALATION | HFA AER AD | BEVESPI AEROSPHERE | glycopyrrolate/formoterol fum  | N |
| B64 | 044508 | 077780 | INHALATION | BLST W/DEV | TRELEGY ELLIPTA    | fluticasone/umeclidin/vilanter | N |
| B64 | 044508 | 081555 | INHALATION | BLST W/DEV | TRELEGY ELLIPTA    | fluticasone/umeclidin/vilanter | N |
| B64 | 046753 | 081351 | INHALATION | HFA AER AD | BREZTRI AEROSPHERE | budesonide/glycopyr/formoterol | N |

Note: Only highlighted agents include inhaled corticosteroids (ICS)

Table E. Long Acting Beta Agonists and Inhaled Corticosteroid combinations

| HIC3 | HSN    | GSN    | RouteDesc  | FormDesc   | Brand                      | Generic                        | PDL |
|------|--------|--------|------------|------------|----------------------------|--------------------------------|-----|
| B63  | 019963 | 043366 | INHALATION | BLST W/DEV | ADVAIR DISKUS              | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043366 | INHALATION | BLST W/DEV | ADVAIR DISKUS              | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043366 | INHALATION | BLST W/DEV | FLUTICASONE-SALMETEROL     | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043366 | INHALATION | BLST W/DEV | FLUTICASONE-SALMETEROL     | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043366 | INHALATION | BLST W/DEV | WIXELA INHUB               | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043367 | INHALATION | BLST W/DEV | ADVAIR DISKUS              | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043367 | INHALATION | BLST W/DEV | ADVAIR DISKUS              | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043367 | INHALATION | BLST W/DEV | FLUTICASONE-SALMETEROL     | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043367 | INHALATION | BLST W/DEV | FLUTICASONE-SALMETEROL     | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043367 | INHALATION | BLST W/DEV | WIXELA INHUB               | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043368 | INHALATION | BLST W/DEV | ADVAIR DISKUS              | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043368 | INHALATION | BLST W/DEV | ADVAIR DISKUS              | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043368 | INHALATION | BLST W/DEV | FLUTICASONE-SALMETEROL     | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043368 | INHALATION | BLST W/DEV | FLUTICASONE-SALMETEROL     | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 043368 | INHALATION | BLST W/DEV | WIXELA INHUB               | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 061343 | INHALATION | HFA AER AD | ADVAIR HFA                 | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 061343 | INHALATION | HFA AER AD | FLUTICASONE-SALMETEROL HFA | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 061344 | INHALATION | HFA AER AD | ADVAIR HFA                 | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 061344 | INHALATION | HFA AER AD | FLUTICASONE-SALMETEROL HFA | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 061345 | INHALATION | HFA AER AD | ADVAIR HFA                 | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 061345 | INHALATION | HFA AER AD | FLUTICASONE-SALMETEROL HFA | fluticasone propion/salmeterol | Y   |
| B63  | 019963 | 077072 | INHALATION | AER POW BA | AIRDUO RESPICLICK          | fluticasone propion/salmeterol | Y   |



|     |        |        |            |            |                                |                                |   |
|-----|--------|--------|------------|------------|--------------------------------|--------------------------------|---|
| B63 | 019963 | 077072 | INHALATION | AER POW BA | FLUTICASONE-SALMETEROL         | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 077072 | INHALATION | AER POW BA | FLUTICASONE-SALMETEROL         | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 077073 | INHALATION | AER POW BA | AIRDUO RESPICLICK              | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 077073 | INHALATION | AER POW BA | FLUTICASONE-SALMETEROL         | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 077073 | INHALATION | AER POW BA | FLUTICASONE-SALMETEROL         | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 077074 | INHALATION | AER POW BA | AIRDUO RESPICLICK              | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 077074 | INHALATION | AER POW BA | FLUTICASONE-SALMETEROL         | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 077074 | INHALATION | AER POW BA | FLUTICASONE-SALMETEROL         | fluticasone propion/salmeterol | Y |
| B63 | 019963 | 081399 | INHALATION | AER PW BAS | AIRDUO DIGIHALER               | fluticasone propion/salmeterol | N |
| B63 | 019963 | 081400 | INHALATION | AER PW BAS | AIRDUO DIGIHALER               | fluticasone propion/salmeterol | N |
| B63 | 019963 | 081401 | INHALATION | AER PW BAS | AIRDUO DIGIHALER               | fluticasone propion/salmeterol | N |
| B63 | 021993 | 062725 | INHALATION | HFA AER AD | BUDESONIDE-FORMOTEROL FUMARATE | budesonide/formoterol fumarate | Y |
| B63 | 021993 | 062725 | INHALATION | HFA AER AD | BUDESONIDE-FORMOTEROL FUMARATE | budesonide/formoterol fumarate | Y |
| B63 | 021993 | 062725 | INHALATION | HFA AER AD | SYMBICORT                      | budesonide/formoterol fumarate | Y |
| B63 | 021993 | 062726 | INHALATION | HFA AER AD | BUDESONIDE-FORMOTEROL FUMARATE | budesonide/formoterol fumarate | Y |
| B63 | 021993 | 062726 | INHALATION | HFA AER AD | BUDESONIDE-FORMOTEROL FUMARATE | budesonide/formoterol fumarate | Y |
| B63 | 021993 | 062726 | INHALATION | HFA AER AD | SYMBICORT                      | budesonide/formoterol fumarate | Y |
| B63 | 037050 | 066480 | INHALATION | HFA AER AD | DULERA                         | mometasone/formoterol          | Y |
| B63 | 037050 | 066481 | INHALATION | HFA AER AD | DULERA                         | mometasone/formoterol          | Y |
| B63 | 037050 | 067555 | INHALATION | HFA AER AD | DULERA                         | mometasone/formoterol          | Y |
| B63 | 040319 | 070972 | INHALATION | BLST W/DEV | BREO ELLIPTA                   | fluticasone/vilanterol         | N |
| B63 | 040319 | 070972 | INHALATION | BLST W/DEV | FLUTICASONE-VILANTEROL         | fluticasone/vilanterol         | N |
| B63 | 040319 | 071815 | INHALATION | BLST W/DEV | BREO ELLIPTA                   | fluticasone/vilanterol         | N |
| B63 | 040319 | 071815 | INHALATION | BLST W/DEV | FLUTICASONE-VILANTEROL         | fluticasone/vilanterol         | N |

Table F. Inhaled Corticosteroids

| HIC3 | HSN    | GSN    | RouteDesc  | FormDesc   | Brand          | Generic                     | PDL |
|------|--------|--------|------------|------------|----------------|-----------------------------|-----|
| B6M  | 000070 | 077643 | INHALATION | HFA AEROBA | QVAR REDIHALER | beclomethasone dipropionate | N   |
| B6M  | 000070 | 077644 | INHALATION | HFA AEROBA | QVAR REDIHALER | beclomethasone dipropionate | N   |
| B6M  | 000070 | 077644 | INHALATION | HFA AEROBA | QVAR REDIHALER | beclomethasone dipropionate | N   |

|     |        |        |            |            |                     |                            |   |
|-----|--------|--------|------------|------------|---------------------|----------------------------|---|
| B6M | 000072 | 000213 | INHALATION | AER W/ADAP | AEROBID             | flunisolide                | N |
| B6M | 002891 | 000212 | INHALATION | AER W/ADAP | AZMACORT            | triamcinolone<br>acetonide | N |
| B6M | 003329 | 051649 | INHALATION | AER POW BA | ASMANEX             | mometasone<br>furoate      | Y |
| B6M | 003329 | 059326 | INHALATION | AER POW BA | ASMANEX             | mometasone<br>furoate      | Y |
| B6M | 003329 | 059326 | INHALATION | AER POW BA | ASMANEX             | mometasone<br>furoate      | Y |
| B6M | 003329 | 059327 | INHALATION | AER POW BA | ASMANEX             | mometasone<br>furoate      | Y |
| B6M | 003329 | 059328 | INHALATION | AER POW BA | ASMANEX             | mometasone<br>furoate      | Y |
| B6M | 003329 | 064010 | INHALATION | AER POW BA | ASMANEX             | mometasone<br>furoate      | Y |
| B6M | 003329 | 073197 | INHALATION | HFA AER AD | ASMANEX HFA         | mometasone<br>furoate      | N |
| B6M | 003329 | 073198 | INHALATION | HFA AER AD | ASMANEX HFA         | mometasone<br>furoate      | N |
| B6M | 003329 | 080669 | INHALATION | HFA AER AD | ASMANEX HFA         | mometasone<br>furoate      | N |
| B6M | 006545 | 018165 | INHALATION | AMPUL-NEB  | BUDESONIDE          | budesonide                 | N |
| B6M | 006545 | 018165 | INHALATION | AMPUL-NEB  | PULMICORT           | budesonide                 | N |
| B6M | 006545 | 046525 | INHALATION | AMPUL-NEB  | BUDESONIDE          | budesonide                 | N |
| B6M | 006545 | 046525 | INHALATION | AMPUL-NEB  | PULMICORT           | budesonide                 | N |
| B6M | 006545 | 046525 | INHALATION | AMPUL-NEB  | PULMICORT           | budesonide                 | N |
| B6M | 006545 | 046526 | INHALATION | AMPUL-NEB  | BUDESONIDE          | budesonide                 | N |
| B6M | 006545 | 046526 | INHALATION | AMPUL-NEB  | PULMICORT           | budesonide                 | N |
| B6M | 006545 | 046526 | INHALATION | AMPUL-NEB  | PULMICORT           | budesonide                 | N |
| B6M | 006545 | 062240 | INHALATION | AER POW BA | PULMICORT FLEXHALER | budesonide                 | Y |
| B6M | 006545 | 062241 | INHALATION | AER POW BA | PULMICORT FLEXHALER | budesonide                 | Y |
| B6M | 006545 | 062241 | INHALATION | AER POW BA | PULMICORT FLEXHALER | budesonide                 | Y |
| B6M | 006607 | 017184 | INHALATION | AER W/ADAP | AEROBID-M           | flunisolide/menthol        | N |
| B6M | 007873 | 019317 | INHALATION | BLST W/DEV | FLOVENT DISKUS      | fluticasone<br>propionate  | Y |
| B6M | 007873 | 019317 | INHALATION | BLST W/DEV | FLOVENT DISKUS      | fluticasone<br>propionate  | Y |
| B6M | 007873 | 019318 | INHALATION | BLST W/DEV | FLOVENT DISKUS      | fluticasone<br>propionate  | Y |
| B6M | 007873 | 019319 | INHALATION | BLST W/DEV | FLOVENT DISKUS      | fluticasone<br>propionate  | Y |
| B6M | 007873 | 021251 | INHALATION | AER W/ADAP | FLOVENT HFA         | fluticasone<br>propionate  | Y |

|     |        |        |            |            |                            |                        |   |
|-----|--------|--------|------------|------------|----------------------------|------------------------|---|
| B6M | 007873 | 021251 | INHALATION | AER W/ADAP | FLOVENT HFA                | fluticasone propionate | Y |
| B6M | 007873 | 021251 | INHALATION | AER W/ADAP | FLUTICASONE PROPIONATE HFA | fluticasone propionate | Y |
| B6M | 007873 | 021251 | INHALATION | AER W/ADAP | FLUTICASONE PROPIONATE HFA | fluticasone propionate | Y |
| B6M | 007873 | 021253 | INHALATION | AER W/ADAP | FLOVENT HFA                | fluticasone propionate | Y |
| B6M | 007873 | 021253 | INHALATION | AER W/ADAP | FLOVENT HFA                | fluticasone propionate | Y |
| B6M | 007873 | 021253 | INHALATION | AER W/ADAP | FLUTICASONE PROPIONATE HFA | fluticasone propionate | Y |
| B6M | 007873 | 021253 | INHALATION | AER W/ADAP | FLUTICASONE PROPIONATE HFA | fluticasone propionate | Y |
| B6M | 007873 | 021483 | INHALATION | AER W/ADAP | FLOVENT HFA                | fluticasone propionate | Y |
| B6M | 007873 | 021483 | INHALATION | AER W/ADAP | FLOVENT HFA                | fluticasone propionate | Y |
| B6M | 007873 | 021483 | INHALATION | AER W/ADAP | FLUTICASONE PROPIONATE HFA | fluticasone propionate | Y |
| B6M | 007873 | 021483 | INHALATION | AER W/ADAP | FLUTICASONE PROPIONATE HFA | fluticasone propionate | Y |
| B6M | 007873 | 081476 | INHALATION | AER PW BAS | ARMONAIR DIGIHALER         | fluticasone propionate | N |
| B6M | 007873 | 081478 | INHALATION | AER PW BAS | ARMONAIR DIGIHALER         | fluticasone propionate | N |
| B6M | 007873 | 081485 | INHALATION | AER PW BAS | ARMONAIR DIGIHALER         | fluticasone propionate | N |
| B6M | 032691 | 058671 | INHALATION | HFA AER AD | ALVESCO                    | ciclesonide            | N |
| B6M | 032691 | 058672 | INHALATION | HFA AER AD | ALVESCO                    | ciclesonide            | N |
| B6M | 034756 | 072722 | INHALATION | BLST W/DEV | ARNUIITY ELLIPTA           | fluticasone furoate    | N |
| B6M | 034756 | 072723 | INHALATION | BLST W/DEV | ARNUIITY ELLIPTA           | fluticasone furoate    | N |
| B6M | 034756 | 078449 | INHALATION | BLST W/DEV | ARNUIITY ELLIPTA           | fluticasone furoate    | N |

Table G. Therapeutic Immune Modulators For Asthma and Atopic Dermatitis

| HIC3 | HSN    | GSN    | RouteDesc | FormDesc   | Brand            | Generic   | PDL |
|------|--------|--------|-----------|------------|------------------|-----------|-----|
| V4D  | 044180 | 077263 | SUBCUT    | SYRINGE    | DUPIXENT SYRINGE | dupilumab | N   |
| V4D  | 044180 | 079179 | SUBCUT    | SYRINGE    | DUPIXENT SYRINGE | dupilumab | N   |
| V4D  | 044180 | 081231 | SUBCUT    | PEN INJCTR | DUPIXENT PEN     | dupilumab | N   |
| V4D  | 044180 | 081615 | SUBCUT    | PEN INJCTR | DUPIXENT PEN     | dupilumab | N   |
| V4D  | 044180 | 082769 | SUBCUT    | SYRINGE    | DUPIXENT SYRINGE | dupilumab | N   |

|     |        |        |          |            |             |                   |   |
|-----|--------|--------|----------|------------|-------------|-------------------|---|
| V4F | 047740 | 082944 | SUBCUT   | SYRINGE    | TEZSPIRE    | tezepelumab-ekko  | N |
| V4F | 047740 | 084017 | SUBCUT   | PEN INJCTR | TEZSPIRE    | tezepelumab-ekko  | N |
| V4G | 047741 | 082945 | SUBCUT   | SYRINGE    | ADBRY       | tralokinumab-ldrm | N |
| Z20 | 042775 | 075111 | SUBCUT   | VIAL       | NUCALA      | mepolizumab       | N |
| Z20 | 042775 | 079828 | SUBCUT   | SYRINGE    | NUCALA      | mepolizumab       | N |
| Z20 | 042775 | 079829 | SUBCUT   | AUTO INJCT | NUCALA      | mepolizumab       | N |
| Z20 | 042775 | 083454 | SUBCUT   | SYRINGE    | NUCALA      | mepolizumab       | N |
| Z20 | 043211 | 075753 | INTRAVEN | VIAL       | CINQAIR     | reslizumab        | N |
| Z23 | 044635 | 077921 | SUBCUT   | SYRINGE    | FASENRA     | benralizumab      | N |
| Z23 | 044635 | 080268 | SUBCUT   | AUTO INJCT | FASENRA PEN | benralizumab      | N |
| Z2L | 025399 | 052758 | SUBCUT   | VIAL       | XOLAIR      | omalizumab        | N |
| Z2L | 025399 | 067907 | SUBCUT   | SYRINGE    | XOLAIR      | omalizumab        | N |
| Z2L | 025399 | 067908 | SUBCUT   | SYRINGE    | XOLAIR      | omalizumab        | N |
| Z2Z | 047767 | 082989 | ORAL     | TABLET     | CIBINQO     | abrocitinib       | N |
| Z2Z | 047767 | 082990 | ORAL     | TABLET     | CIBINQO     | abrocitinib       | N |
| Z2Z | 047767 | 082991 | ORAL     | TABLET     | CIBINQO     | abrocitinib       | N |

Table H. Oral Glucocorticoids

| HIC3 | HSN    | GSN    | Route | Form         | Brand              | Generic            | PDL |
|------|--------|--------|-------|--------------|--------------------|--------------------|-----|
| P5A  | 002860 | 006685 | ORAL  | TABLET       | CORTISONE ACETATE  | cortisone acetate  | Y   |
| P5A  | 002867 | 006703 | ORAL  | TABLET       | CORTEF             | hydrocortisone     | Y   |
| P5A  | 002867 | 006703 | ORAL  | TABLET       | HYDROCORTISONE     | hydrocortisone     | Y   |
| P5A  | 002867 | 006704 | ORAL  | TABLET       | CORTEF             | hydrocortisone     | Y   |
| P5A  | 002867 | 006704 | ORAL  | TABLET       | HYDROCORTISONE     | hydrocortisone     | Y   |
| P5A  | 002867 | 006705 | ORAL  | TABLET       | CORTEF             | hydrocortisone     | Y   |
| P5A  | 002867 | 006705 | ORAL  | TABLET       | HYDROCORTISONE     | hydrocortisone     | Y   |
| P5A  | 002874 | 006719 | ORAL  | SOLUTION     | PREDNISOLONE       | prednisolone       | Y   |
| P5A  | 002877 | 006737 | ORAL  | TABLET       | MEDROL             | methylprednisolone | Y   |
| P5A  | 002877 | 006737 | ORAL  | TABLET       | METHYLPREDNISOLONE | methylprednisolone | Y   |
| P5A  | 002877 | 006738 | ORAL  | TABLET       | MEDROL             | methylprednisolone | Y   |
| P5A  | 002877 | 006739 | ORAL  | TABLET       | MEDROL             | methylprednisolone | Y   |
| P5A  | 002877 | 006740 | ORAL  | TABLET       | METHYLPREDNISOLONE | methylprednisolone | Y   |
| P5A  | 002877 | 006741 | ORAL  | TABLET       | MEDROL             | methylprednisolone | Y   |
| P5A  | 002877 | 006741 | ORAL  | TABLET       | METHYLPREDNISOLONE | methylprednisolone | Y   |
| P5A  | 002877 | 006742 | ORAL  | TABLET       | MEDROL             | methylprednisolone | Y   |
| P5A  | 002877 | 006742 | ORAL  | TABLET       | METHYLPREDNISOLONE | methylprednisolone | Y   |
| P5A  | 002877 | 045311 | ORAL  | TAB DS<br>PK | MEDROL             | methylprednisolone | Y   |

|     |        |        |      |              |                           |                    |   |
|-----|--------|--------|------|--------------|---------------------------|--------------------|---|
| P5A | 002877 | 045311 | ORAL | TAB DS<br>PK | METHYLPREDNISOLONE        | methylprednisolone | Y |
| P5A | 002879 | 006745 | ORAL | ORAL<br>CONC | PREDNISONE INTENSOL       | prednisone         | Y |
| P5A | 002879 | 006746 | ORAL | SOLUTION     | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 006748 | ORAL | TABLET       | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 006749 | ORAL | TABLET       | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 006750 | ORAL | TABLET       | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 006751 | ORAL | TABLET       | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 006753 | ORAL | TABLET       | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 006754 | ORAL | TABLET       | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 045267 | ORAL | TAB DS<br>PK | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 045268 | ORAL | TAB DS<br>PK | PREDNISONE                | prednisone         | Y |
| P5A | 002879 | 069864 | ORAL | TABLET<br>DR | RAYOS                     | prednisone         | Y |
| P5A | 002879 | 069865 | ORAL | TABLET<br>DR | RAYOS                     | prednisone         | Y |
| P5A | 002879 | 069866 | ORAL | TABLET<br>DR | RAYOS                     | prednisone         | Y |
| P5A | 002889 | 006780 | ORAL | ELIXIR       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006781 | ORAL | SOLUTION     | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006782 | ORAL | DROPS        | DEXAMETHASONE<br>INTENSOL | dexamethasone      | Y |
| P5A | 002889 | 006784 | ORAL | TABLET       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006785 | ORAL | TABLET       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006786 | ORAL | TABLET       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006787 | ORAL | TABLET       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006788 | ORAL | TABLET       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006789 | ORAL | TABLET       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 006790 | ORAL | TABLET       | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 045306 | ORAL | TAB DS<br>PK | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 046463 | ORAL | TAB DS<br>PK | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 061392 | ORAL | TAB DS<br>PK | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 064893 | ORAL | TAB DS<br>PK | DEXAMETHASONE             | dexamethasone      | Y |
| P5A | 002889 | 064893 | ORAL | TAB DS<br>PK | TAPERDEX                  | dexamethasone      | Y |

|     |        |        |      |               |                                  |                                  |   |
|-----|--------|--------|------|---------------|----------------------------------|----------------------------------|---|
| P5A | 002889 | 077133 | ORAL | TAB DS<br>PK  | TAPERDEX                         | dexamethasone                    | Y |
| P5A | 002889 | 077745 | ORAL | TAB DS<br>PK  | TAPERDEX                         | dexamethasone                    | Y |
| P5A | 002867 | 079919 | ORAL | CAP<br>SPRINK | ALKINDI SPRINKLE                 | hydrocortisone                   | N |
| P5A | 002867 | 079920 | ORAL | CAP<br>SPRINK | ALKINDI SPRINKLE                 | hydrocortisone                   | N |
| P5A | 002867 | 079921 | ORAL | CAP<br>SPRINK | ALKINDI SPRINKLE                 | hydrocortisone                   | N |
| P5A | 002867 | 079922 | ORAL | CAP<br>SPRINK | ALKINDI SPRINKLE                 | hydrocortisone                   | N |
| P5A | 002871 | 038375 | ORAL | SOLUTION      | PEDIAPRED                        | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 038375 | ORAL | SOLUTION      | PREDNISOLONE SODIUM<br>PHOSPHATE | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 041424 | ORAL | SOLUTION      | PREDNISOLONE SODIUM<br>PHOSPHATE | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 047282 | ORAL | SOLUTION      | PREDNISOLONE SODIUM<br>PHOSPHATE | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 060956 | ORAL | TAB<br>RAPDIS | PREDNISOLONE SODIUM<br>PHOS ODT  | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 060957 | ORAL | TAB<br>RAPDIS | PREDNISOLONE SODIUM<br>PHOS ODT  | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 060958 | ORAL | TAB<br>RAPDIS | PREDNISOLONE SODIUM<br>PHOS ODT  | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 063898 | ORAL | SOLUTION      | PREDNISOLONE SODIUM<br>PHOSPHATE | prednisolone sodium<br>phosphate | N |
| P5A | 002871 | 064528 | ORAL | SOLUTION      | PREDNISOLONE SODIUM<br>PHOSPHATE | prednisolone sodium<br>phosphate | N |
| P5A | 002874 | 006721 | ORAL | TABLET        | MILLIPRED                        | prednisolone                     | N |
| P5A | 002874 | 006721 | ORAL | TABLET        | PREDNISOLONE                     | prednisolone                     | N |
| P5A | 002889 | 080270 | ORAL | TABLET        | HEMADY                           | dexamethasone                    | N |

Table I. Leukotriene Modifiers

| HIC3 | HSN    | GSN    | Route | Form        | Brand                 | Generic               | PDL |
|------|--------|--------|-------|-------------|-----------------------|-----------------------|-----|
| Z4B  | 016911 | 037003 | ORAL  | TAB<br>CHEW | MONTELUKAST<br>SODIUM | montelukast<br>sodium | Y   |
| Z4B  | 016911 | 037003 | ORAL  | TAB<br>CHEW | SINGULAIR             | montelukast<br>sodium | Y   |

|     |        |        |      |           |                    |                    |   |
|-----|--------|--------|------|-----------|--------------------|--------------------|---|
| Z4B | 016911 | 038451 | ORAL | TABLET    | MONTELUKAST SODIUM | montelukast sodium | Y |
| Z4B | 016911 | 038451 | ORAL | TABLET    | SINGULAIR          | montelukast sodium | Y |
| Z4B | 016911 | 044803 | ORAL | TAB CHEW  | MONTELUKAST SODIUM | montelukast sodium | Y |
| Z4B | 016911 | 044803 | ORAL | TAB CHEW  | SINGULAIR          | montelukast sodium | Y |
| Z2X | 037123 | 066612 | ORAL | TABLET    | DALIRESP           | roflumilast        | N |
| Z2X | 037123 | 066612 | ORAL | TABLET    | ROFLUMILAST        | roflumilast        | N |
| Z2X | 037123 | 078213 | ORAL | TABLET    | DALIRESP           | roflumilast        | N |
| Z2X | 037123 | 078213 | ORAL | TABLET    | ROFLUMILAST        | roflumilast        | N |
| Z4B | 011815 | 027962 | ORAL | TABLET    | ACCOLATE           | zafirlukast        | N |
| Z4B | 011815 | 027962 | ORAL | TABLET    | ZAFIRLUKAST        | zafirlukast        | N |
| Z4B | 011815 | 043557 | ORAL | TABLET    | ACCOLATE           | zafirlukast        | N |
| Z4B | 011815 | 043557 | ORAL | TABLET    | ZAFIRLUKAST        | zafirlukast        | N |
| Z4B | 016911 | 051512 | ORAL | GRAN PACK | MONTELUKAST SODIUM | montelukast sodium | N |
| Z4B | 016911 | 051512 | ORAL | GRAN PACK | SINGULAIR          | montelukast sodium | N |
| Z4E | 012321 | 029803 | ORAL | TABLET    | ZYFLO              | zileuton           | N |
| Z4E | 012321 | 063062 | ORAL | TBMP 12HR | ZILEUTON ER        | zileuton           | N |
| Z2X | 037123 | 078213 | ORAL | TABLET    | ROFLUMILAST        | roflumilast        |   |

Note: roflumilast is indicated only for COPD and was not included in the definition for leukotriene modifiers

Table J. ICD 10 codes of Interest

| Diagnosis  | ICD-10 Code-CM code |
|--|---------------------|
| Asthma   | J45.x               |
| Asthma Types   |                     |
| Mild intermittent asthma                               | J45.2x              |
| Mild persistent asthma                                 | J45.3x              |
| Moderate persistent asthma                             | J45.4x              |
| Severe persistent asthma                               | J45.5x              |
| Other and unspecified asthma                           | J45.5x              |
| Other asthma (includes exercised induced bronchospasm) | J45.9x              |
| Comorbidities  |                     |
| Chronic Obstructive Pulmonary Disease                  | J44.x               |

Table K. Package sizes for asthma inhalers

| NameDrugGen       | NameDrugBrand         | QuanSizeDrugPkg | TextDrugStr | GSN   |
|-------------------|-----------------------|-----------------|-------------|-------|
| albuterol sulfate | ALBUTEROL SULFATE HFA | 6.7             | 90 mcg      | 28090 |
| albuterol sulfate | PROVENTIL HFA         | 6.7             | 90 mcg      | 28090 |
| albuterol sulfate | ALBUTEROL SULFATE HFA | 7               | 90 mcg      | 28090 |
| albuterol sulfate | VENTOLIN HFA          | 8               | 90 mcg      | 28090 |
| albuterol sulfate | ALBUTEROL SULFATE HFA | 8.5             | 90 mcg      | 28090 |
| albuterol sulfate | PROAIR HFA            | 8.5             | 90 mcg      | 28090 |
| albuterol sulfate | ALBUTEROL SULFATE HFA | 18              | 90 mcg      | 28090 |
| albuterol sulfate | VENTOLIN HFA          | 18              | 90 mcg      | 28090 |

**Table L.** ICD-10 codes of interest for post-hoc assessment of patients without asthma or chronic obstructive pulmonary disease

| Diagnosis   | ICD-10 Code-CM code |
|---|---------------------|
| Diseases of respiratory system  | Jx                  |
| Provisional assignment of new disease of uncertain etiology or emergency use                      | U00-U85             |
| Personal history of Covid-19  | Z86.16              |
| Viral infection of unspecified site   | B34x                |
| Sleep apnea   | G473x               |
| Tobacco use and nicotine dependence   | Z72.0 and F17x      |
| Cystic fibrosis   | E.84.x              |
| R codes: Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified |                     |
| Cough   | R05x                |
| Abnormalities of breathing  | R06x                |
| Other symptoms of the circulatory/respiratory system  | R09x                |
| Malaise/fatigue   | R53x                |
| Abnormal findings in specimens from respiratory organs and thorax                                 | R84x                |
| Abnormal findings on diagnostic imaging of lung   | R91x                |