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Center for Drug Evaluation and Research  
Office of Surveillance and Epidemiology  
Pediatric Postmarketing Pharmacovigilance and Drug Utilization Review**

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**Product Name(s):** Asmanex HFA and Asmanex Twisthaler  
(mometasone furoate inhalation)

**Pediatric Labeling  
Approval Date:** April 25, 2014

**Application Type/Number:** NDA 205641 and NDA 021067

**Applicant/Sponsor:** Merck Sharp & Dohme Corp.

**OSE RCM #:** 2016-2583

**\*\*This document contains proprietary drug use data obtained by FDA under contract. The drug use data/information cannot be released to the public/non-FDA personnel without contractor approval obtained through the FDA/CDER Office of Surveillance and Epidemiology.\*\***

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## **EXECUTIVE SUMMARY**

In accordance with the Food and Drug Administration Amendments Act (FDAAA) Best Pharmaceuticals for Children Act (BPCA) and Pediatric Research Equity Act (PREA), the Office of Surveillance and Epidemiology (OSE) evaluated postmarketing adverse event reports with a serious outcome and drug utilization data for Asmanex HFA (mometasone furoate inhalation aerosol) in pediatric patients. Asmanex HFA was first approved on April 25, 2014. It is indicated for maintenance treatment of asthma as prophylactic therapy in patients 12 years of age and older, and the approval triggered this review.

The outpatient retail utilization data showed that pediatric patients 0-16 years of age accounted for 30% (26,000 patients) of the total patients who were dispensed Asmanex HFA prescriptions, and 22% (138,000 patients) of the total patients who were dispensed Asmanex Twisthaler (mometasone furoate dry powder inhalation) prescriptions from April 2014 through December 2016, cumulative. Patients 5-11 years of age accounted for approximately half of the pediatric utilization of Asmanex HFA and Asmanex Twisthaler.

The Food and Drug Administration Adverse Event Reporting System database (FAERS) was searched for all reports of adverse events received through December 31, 2016. The Division of Pharmacovigilance (DPV) focused on serious pediatric reports of unlabeled events.

The review of the FAERS pediatric cases resulted in the identification of 19 pediatric cases of serious, unlabeled events. Notably, our case series included Asmanex HFA and Asmanex Twisthaler because we evaluated all reports of mometasone furoate inhalation. The majority of the cases had alternative plausible explanations for the events, lacked clinical information for proper assessment, or a temporal relationship with mometasone inhalation use was absent.

There were four cases of unlabeled events (one report of aggression with Asmanex HFA; and one report each of substance-induced psychotic disorder, dizziness, and device failure with Asmanex Twisthaler) that we could not exclude the role of mometasone furoate inhalation. Given the small number of reports and the number of pediatric patients who received prescriptions for these products, these reports do not suggest new safety signals that warrant labeling update at this time. DPV plans to continue postmarketing surveillance of these events.

## **1 INTRODUCTION**

This review evaluates postmarketing adverse event reports with a serious outcome and drug utilization data for Asmanex HFA (mometasone furoate inhalation aerosol) in pediatric patients. The approval of Asmanex HFA for maintenance treatment of asthma as prophylactic therapy in patients 12 years and older on April 25, 2014, triggered this review.

## 1.1 PEDIATRIC REGULATORY HISTORY

Asmanex HFA (mometasone furoate inhalation aerosol) was approved on April 25, 2014, for the maintenance treatment of asthma as prophylactic therapy. There is another mometasone furoate inhalation product, Asmanex Twisthaler (mometasone furoate inhalation powder), which was initially approved on March 30, 2005, for the maintenance treatment of asthma in patients 12 years of age and older. On February 1, 2008, an efficacy supplement was approved for Asmanex Twisthaler for the maintenance treatment of asthma in children 4-11 years of age. For the purpose of this review, “mometasone furoate inhalation” refers to Asmanex HFA and Asmanex Twisthaler.

The following regulatory history was reproduced from Dr. Kimberly Witzmann’s (medical officer in the Division of Pulmonary, Allergy, and Rheumatology Products (DPARP)) clinical review of Asmanex HFA (mometasone furoate inhalation aerosol).<sup>1</sup>

The proposed drug product is mometasone furoate (MF) metered-dose inhaler (MDI), which is an inhaled corticosteroid (ICS). The proposed trade name is Asmanex HFA®. Two dosage strengths are proposed: 100mcg per inhalation, and 200mcg per inhalation (ex-mouthpiece dose) to be given as 2 inhalations twice daily (BID). This review refers to the therapeutic dose of mometasone delivered by two actuations, i.e., MF 200mcg and 400mcg, respectively. Mometasone is also approved to treat asthma in a dry powder inhaler formulation, as Asmanex Twisthaler®.

Mometasone is also available as part of the Dulera® MDI product [NDA# 22-518], approved in 2010, which consists of two dosage strengths of mometasone furoate ICS, in combination with formoterol fumarate, a long-acting beta-agonist (LABA): 100/5mcg per inhalation (200/10mcg BID), and the 200/5mcg per inhalation (400/10mcg BID). The current product under review is essentially the Dulera MDI inhaler minus the formoterol fumarate component. The inhaler device, excipients, and propellants (HFA) are otherwise the same as for the combination ICS-LABA metered-dose inhaler. During the review of Dulera, the Applicant agreed to bring forward a mometasone MDI monotherapy, because there is no other MDI formulation available for mometasone to use as step-down therapy from the combination ICS-LABA, as recommended in national and international asthma guidelines. No new studies have been conducted to support this NDA; the pivotal data is the same as was used in the Dulera registration program.

## 1.2 PREVIOUS RELEVANT OSE POSTMARKETING REVIEW

### 2008 OSE Pediatric Postmarketing Adverse Event Review for mometasone furoate<sup>2</sup>

On February 1, 2008, the supplemental new drug application which provides for the use of Asmanex Twisthaler for the maintenance treatment of asthma in children 4-11 years of age was approved by DPARP. It was determined that the Sponsor had adequately demonstrated the efficacy and safety of Asmanex Twisthaler in asthmatic children 4 to 11 years of age; the labeling was updated to include this age group and triggered the pediatric postmarketing adverse event review in 2008. The Adverse Event Reporting System (AERS) was searched for all adverse events reported in children (ages 0 to 17) using mometasone furoate (Asmanex) as a

search term from initial approval date (March 30, 2005) to October 31, 2008. The reviewer recommendation was for DPARP to consider expanding the Warnings section regarding bronchospasm to include hypersensitivity events (e.g., angioedema, urticaria, dyspnea, swelling, and throat tightness).

*Reviewer comment: The Asmanex Twisthaler label was subsequently updated. In the postmarketing section of the current Asmanex Twisthaler label, it states that Immune System Disorders: Immediate and delayed hypersensitivity reactions including rash, pruritus, angioedema and anaphylactic reaction have been reported. Note that in the Warnings and Precautions section of the current Asmanex HFA label, it states hypersensitivity reactions as: Hypersensitivity reactions, such as urticaria, flushing, allergic dermatitis, bronchospasm, rash, pruritus, angioedema, and anaphylactic reaction may occur (see section 1.3).*

### **1.3 HIGHLIGHTS OF LABELED SAFETY ISSUES FOR ASMANEX HFA AND ASMANEX TWISTHALER<sup>3,4</sup>**

#### **-----WARNINGS AND PRECAUTIONS-----**

- Paradoxical bronchospasm: Discontinue Asmanex HFA and institute alternative therapy if paradoxical bronchospasm occurs.
- Hypersensitivity reactions including anaphylaxis: Hypersensitivity reactions, such as urticaria, flushing, allergic dermatitis, bronchospasm, rash, pruritus, angioedema, and anaphylactic reaction may occur. Discontinue Asmanex HFA if such reactions occur.
- Hypersensitivity reactions including anaphylaxis, angioedema, pruritus, and rash have been reported with the use of Asmanex Twisthaler. Discontinue Asmanex Twisthaler if such reactions occur.
- Paradoxical bronchospasm may occur with Asmanex Twisthaler. Treat bronchospasm immediately with a fast-acting inhaled bronchodilator and discontinue use of Asmanex Twisthaler.

#### **-----ADVERSE REACTIONS-----**

Most common adverse reactions (reported in greater than or equal to 3% of patients) included:

- Nasopharyngitis, headache, sinusitis, bronchitis, and influenza. (Asmanex HFA)

The most common adverse reactions (incidence  $\geq 5\%$ ) are headache, allergic rhinitis, pharyngitis, upper respiratory tract infection, sinusitis, oral candidiasis, dysmenorrhea, musculoskeletal pain, back pain, and dyspepsia. (Asmanex Twisthaler)

#### **-----USE IN SPECIFIC POPULATIONS-----**

- The safety and effectiveness of Asmanex HFA have been established in patients 12 years of age and older in 2 clinical trials of 12 and 26 weeks in duration. In the 2 clinical trials, 32 patients 12 to 17 years of age were treated with Asmanex HFA. No overall differences in effectiveness were observed between patients in this age group compared to those observed in patients 18 years of age and older. There were no obvious differences in the type or frequency of adverse drug reactions reported in this age group compared to patients 18 years of age and older. The safety and efficacy of Asmanex HFA have not been established in children less than 12 years of age (Asmanex HFA)
- The most common adverse reactions (incidence 5%) are headache, allergic rhinitis, pharyngitis, upper respiratory tract infection, sinusitis, oral candidiasis, dysmenorrhea, musculoskeletal pain, back pain, and dyspepsia. (Asmanex Twisthaler)

## **2 DRUG UTILIZATION DATA**

### **2.1 METHODS AND MATERIALS**

#### **2.1.1 Data Sources Used**

Proprietary databases available to the Agency were used to conduct the drug utilization analyses in this review (see Appendix A for full database descriptions and limitations).

The QuintilesIMS, Total Patient Tracker (TPT) database was used to provide national estimates of unique patients who received dispensed prescriptions for Asmanex HFA and Asmanex Twisthaler, stratified by patient age (0-4, 5-11, 12-16, and 17+ years), from U.S. outpatient retail pharmacies for the cumulative time period from April 2014 through December 2016.

## **2.2 RESULTS**

### **2.2.1 Determining Settings of Care**

Based on the QuintilesIMS, National Sales Perspectives™ database, approximately 69%, 17%, and 14% of Asmanex HFA and Asmanex Twisthaler packages were distributed to outpatient retail pharmacies<sup>5</sup>, mail-order/specialty settings, and non-retail settings<sup>6</sup>, respectively, in 2016.<sup>7</sup> As a result, we examined Asmanex HFA and Asmanex Twisthaler utilization patterns in the outpatient retail pharmacy setting. Data from non-retail and mail-order/specialty settings are excluded from the analysis.

### **2.2.2 Number of Patients**

**Table 2.2.2. National estimates of unique patients\*, stratified by patient age\*\*, who received dispensed prescriptions for Asmanex® HFA and Asmanex® Twisthaler® from U.S. outpatient retail pharmacies, cumulative April 2014 through December 2016**

	4/2014-12/2016 (Cumulative)	
	N	%
<b>Total Patients</b>	<b>706,129</b>	<b>100.0%</b>
<b>Asmanex® Twisthaler®</b>	627,427	88.9%
<b>0 - 16 years</b>	137,711	21.9%
0 - 4 years	4,997	3.6%
5 - 11 years	74,787	54.3%
12 - 16 years	66,729	48.5%
17+ years	489,270	78.0%
Unknown Age	7,547	1.2%
<b>Asmanex® HFA</b>	85,661	12.1%
<b>0 - 16 years</b>	25,798	30.1%
0 - 4 years	4,566	17.7%
5 - 11 years	14,129	54.8%
12 - 16 years	7,759	30.1%
17+ years	59,191	69.1%
Unknown Age	819	1.0%

Source: QuintilesIMS, Total Patient Tracker. April 2014 through December 2016. Data extracted February 2017. File: TPT 2016-2583 asmanex HFA & twisthaler BPCA product age 2-21-2017.xls

\*Patient subtotals may not sum exactly because patients aged over time and may be receiving multiple products during the examined time. For this reason, summing patients across products is not advisable and will result in overestimates of patient counts. Moreover, the sum of the percentages will be greater than 100% because patients are double counted across products.

\*\*Patient age groups are inclusive of all patients up to the day before their next birthday. For example, patients aged 0-16 years include patients less than 17 years old (16 years and 11 months).

### 3 POSTMARKET ADVERSE EVENT REPORTS

#### 3.1 METHODS AND MATERIALS

##### 3.1.1 FDA Adverse Event Reporting System (FAERS) Search Strategy

DPV searched the FAERS database with the strategy described in Table 3.1.1. See Appendix B for a description of the FAERS database.

**Table 3.1.1 FAERS Search Strategy**

Date of Search	January 5, 2017
Time Period of Search	Entire database through December 31, 2016*
Search Type	Quick Query
Product Name	Product Active Ingredient: Mometasone, Mometasone furoate
Search Parameters	All ages, all outcomes, worldwide

\*The FAERS search strategy was different than the prior OSE review (see Section 1.2); therefore, we did not use that review's cut-off date (October 31, 2008).

## 3.2 RESULTS

### 3.2.1 Total number of FAERS reports by Age

**Table 3.2.1 Total adult and pediatric FAERS reports\* through December 31, 2016 with mometasone furoate inhalation**

	All reports (US)	Serious <sup>†</sup> (US)	Death (US)
<b>Adults (<math>\geq 17</math> years)</b>	2702 (2004)	1537(866)	36 (18)
<b>Pediatrics (0 - &lt;17 years)</b>	495 (353)	<b>41<sup>‡</sup> (37)</b>	0 (0)

\* May include duplicates and transplacental exposures, and have not been assessed for causality

† For the purposes of this review, the following outcomes qualify as serious: death, life-threatening, hospitalization (initial or prolonged), disability, congenital anomaly, required intervention, and other serious important medical events.

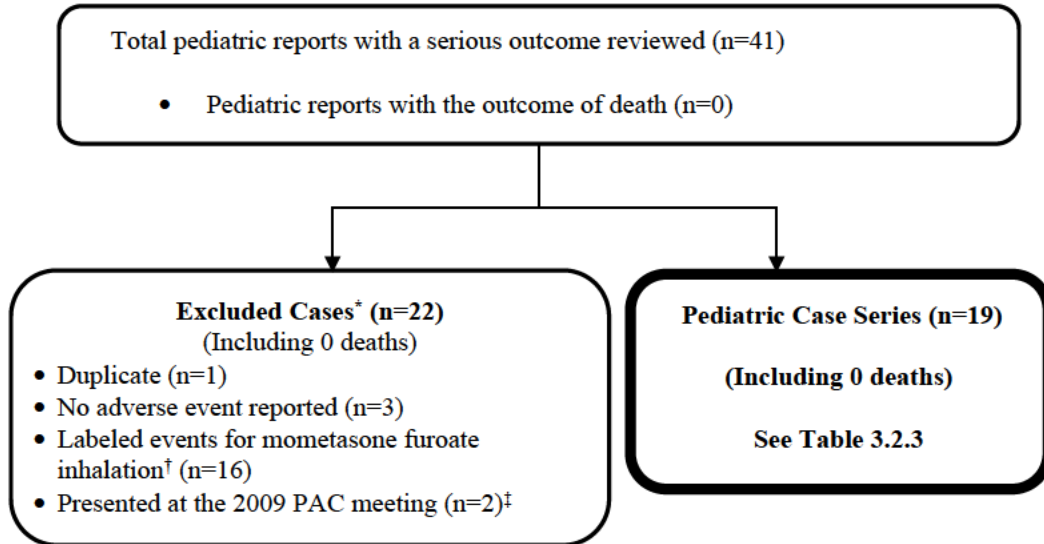
‡ FAERS search strategy using Product Active Ingredient mometasone furoate captures reports with other mometasone furoate products (Nasonex and Elocon Cream) in addition to the products of interest (i.e., Asmanex HFA and Asmanex Twisthaler). There were 311 reports of mometasone furoate. Of the 311 reports, 270 involved Nasonex (193) and Elocon cream (77).

### 3.2.2 Selection of Serious Pediatric Cases in FAERS

We identified 41 pediatric reports with a serious outcome. See Figure 3.2.2 for the specific selection of serious pediatric cases with mometasone furoate inhalation in Sections 3.3 and 3.4.



**Figure 3.2.2 Selection of Serious Pediatric Cases with mometasone furoate inhalation**



\* DPV reviewed these cases, but they were excluded from the case series for the reasons listed above.

† The labeled events/PTs were anaphylactic reaction (n=3), angioedema (n=3), dyspnea (n=3), hypersensitivity (n=2), wheezing (n=2), bronchospasm (n=1), headache (n=1), and urticaria (n=1). They did not appear to occur at an increased frequency or severity.

‡ One report of suicidal thoughts and one report of tremor were reviewed in the previous 2008 OSE Pediatric Postmarketing Adverse Event Review for mometasone furoate, which was presented at the June 2009 Pediatric Advisory Committee meeting.

### 3.2.3 Characteristics of Pediatric Case Series

Appendix C lists all the FAERS case numbers, FAERS version numbers, and Manufacturer Control Numbers for the Pediatric Case Series.

**Table 3.2.3 Characteristics of FAERS Pediatric Case Series with mometasone furoate inhalation (N=19)**

Age	0 - < 1 month	0
	1 month - <2 years	0
	2- < 6 years	2
	6- <12 years	7
	12- < 17 years	10
Sex	Male	10
	Female	9
Country	United States	18
	Foreign	1
Reported Reason for Use	Asthma	16
	Unknown	3

**Table 3.2.3 Characteristics of FAERS Pediatric Case Series with mometasone furoate inhalation (N=19)**

Serious Outcome*	Life-threatening	1
	Hospitalized	3
	Disability	1
	Required Intervention	2
	Other serious	17
Product (from narrative)	Asmanex	8
	Asmanex Twisthaler	7
	Mometasone furoate	3
	Asmanex HFA	1

\* For the purposes of this review, the following outcomes qualify as serious: death, life-threatening, hospitalization (initial or prolonged), disability, congenital anomaly, required intervention, and other serious important medical events. Reports may have more than one outcome.

### 3.3 SUMMARY OF FATAL PEDIATRIC ADVERSE EVENT CASES (N=0)

There were no fatalities involving children using mometasone furoate inhalation through December 31, 2016.

### 3.4 SUMMARY OF NON-FATAL PEDIATRIC SERIOUS ADVERSE EVENT REPORTS (N=19)

We reviewed 19 reports that described non-fatal serious pediatric adverse events. Of the 19 reports, seven did not have a temporal relationship with mometasone furoate inhalation use, four had alternative plausible explanations for the events (such as history of seizures, celiac disease, and scoliosis), and four lacked clinical information for proper assessment. The remaining four cases that described serious and unlabeled events are briefly described in **sections 3.4.1 to 3.4.3**.

Cases in these sections are categorized by Preferred Terms (PTs) that best represent the reported adverse event(s). The PTs are then grouped by like terms and organized by System Organ Class: Psychiatric disorders (n=2), Nervous system disorders (n=1), and Product issues (n=1). Narratives of the four cases are found below.

#### **Unlabeled Event(s)**

##### **3.4.1 Psychiatric disorders (N=2)**

###### ***Aggression (n=1)***

Case # 12959637, US, 2016: A 6-year-old male took “Asmanex inhaler HFA” twice per day, every day for a few months for asthma. He experienced “major behavioral issues,” including “aggressiveness, defiance, constantly being in trouble at school, and getting physical with family and other students.” The reporter (mom) mentioned that “the medication” was discontinued and “the behavior issues have gone away.” Concomitant medication included fish oil.

###### ***Substance-induced psychotic disorder (n=1)***

Case # 10483751, US, 2014: A 9-year-old male started Asmanex Twisthaler 110mcg one time a day at night and experienced anxiety and became increasingly paranoid. The patient thought he

was going to die and started to hallucinate. The patient did not have a history of mental disorders. The physician said that steroid psychosis was not typical of inhaled corticosteroids. The patient discontinued Asmanex Twisthaler and “seems like himself.” The patient was going to be evaluated by a psychiatrist to see if he needs medication while the Asmanex “clears from his system.”

*Reviewer Comment: The cases contained limited information to establish the relationship between the adverse event and mometasone furoate inhalation. It is estimated that 13–20 percent of children living in the United States experience a mental disorder in a given year.<sup>8</sup> DPV will continue postmarketing surveillance of these events for increase in frequency and severity of reports.*

### **3.4.2 Nervous system disorders (N=1)**

#### ***Dizziness (n=1)***

Case # 7661385, US, 2010: A 14-year-old male, on an unspecified date, started Asmanex Twisthaler 220 mcg for the treatment of asthma (frequency was not provided) and presented with severe dizziness and passed out. The patient went to the doctor's office for medical evaluation and discontinued the Asmanex Twisthaler. No further information was provided. The patient's concomitant medications included montelukast, salbutamol, and cetirizine hydrochloride. The medical history was not provided.

*Reviewer Comment: Dizziness is a labeled event in the montelukast and salbutamol labels. Limitations to case interpretation include confounders such as concomitant medications and incomplete case descriptions. DPV will continue postmarketing surveillance of dizziness for increase in frequency and severity of reports.*

### **3.4.3 Product issue (N=1)**

#### ***Device failure (n=1)***

Case # 6227655, US, 2007: A 14-year-old female experienced device failure with Asmanex Twisthaler. The report described that once the counter gets to 0 the device was supposed to lock, however, with a minimal amount of pressure the locking mechanism was “easily overcome” and the inhaler resets to 199 doses. The patient was unaware that this occurred and assumed there were remaining doses even though the device did not dispense additional medication. The patient's asthma was untreated and resulted in severe exacerbations.

*Reviewer Comment: This report was received in FAERS in 2007; the inhaler was not sent to the Sponsor to investigate. DPV will continue postmarketing surveillance of these events for increase in frequency and severity of reports.*

## **4 DISCUSSION**

The outpatient retail utilization analysis showed that pediatric patients less than 17 years of age accounted for 30% (26,000 patients) of the total patients who were dispensed Asmanex HFA prescriptions, and 22% (138,000 patients) of the total patients who were dispensed Asmanex Twisthaler prescriptions from April 2014 through December 2016, cumulative. The data also showed Asmanex HFA use in patients under 12 years of age and Asmanex Twisthaler use in patients under 5 years of age; however, these use cannot be validated due to the lack of access to

patient medical records. Furthermore, our analyses only focused on the outpatient retail setting and might not apply to other settings of care such as inpatient setting and clinics where Asmanex HFA and Asmanex Twisthaler may be used.

The review of the FAERS pediatric cases resulted in the identification of 19 pediatric cases of serious, unlabeled events. Our case series included Asmanex HFA and Asmanex Twisthaler. The majority of the cases had alternative plausible explanations for the events (such as history of seizures, celiac disease, and scoliosis), lacked clinical information for proper assessment, or a temporal relationship with mometasone inhalation use was absent.

There were four cases of unlabeled events (one report of aggression with Asmanex HFA; and one report each of substance-induced psychotic disorder, dizziness, and device failure with Asmanex Twisthaler) that we could not exclude the role of mometasone furoate inhalation. Given the small number of reports and the number of pediatric patients who received prescriptions for these products, these reports do not suggest new safety signals that warrant labeling update at this time.

## **5 CONCLUSION**

Although there are data suggestive of use in patients 4 years and younger, overall, there were no clear patterns of reported adverse events in the cases to suggest a new safety signal associated with mometasone furoate inhalation in pediatric patients. The pediatric safety profile described in these reports is consistent with the known safety profile and the current mometasone furoate inhalation labels. We did not identify any new safety concerns that warrant labeling update at this time.

## **6 RECOMMENDATIONS**

DPV plans to continue postmarketing surveillance of all adverse events with the use of mometasone furoate inhalation in the pediatric patients.

## 7 REFERENCES

1. Witzmann, Kimberly, MD. Asmanex HFA Clinical Review. March 21, 2014.
2. Mackey, Ann, RPh, MPH. Asmanex Pediatric Postmarketing Adverse Event Review. January 6, 2008.
3. Asmanex HFA [package insert]. Whitehouse Station, NJ: Merck Sharp & Dohme Corp.; August 2015.
4. Asmanex Twisthaler [package insert]. Whitehouse Station, NJ: Merck Sharp & Dohme Corp.; September 2010.
5. Retail settings include chain drug stores, independent drug stores, mass merchandisers, and food stores.
6. Non-retail settings include clinics, non-federal hospitals, federal facilities, HMOs, long-term care facilities, home health care, and other miscellaneous settings.
7. Source: QuintilesIMS, National Sales Perspectives™. Year 2016. Data extracted February 2017. File: NSP 2016-2583 mometasone inhalation channel 2-17-2017.xlsx
8. Centers for Disease Control and Prevention.  
<https://www.cdc.gov/features/childrensmentalhealth/> (Assessed February 8, 2017).

## 8 APPENDICES

### 8.1 APPENDIX A. DRUG UTILIZATION DATABASE DESCRIPTIONS/LIMITATIONS

#### **QuintilesIMS, National Sales Perspectives™: Retail and Non-Retail**

The IMS Health, IMS National Sales Perspectives™ measures the volume of drug products, both prescription and over-the-counter, and selected diagnostic products moving from manufacturers into various outlets within the retail and non-retail markets. Volume is expressed in terms of sales dollars, eaches, extended units, and share of market. These data are based on national projections. Outlets within the retail market include the following pharmacy settings: chain drug stores, independent drug stores, mass merchandisers, food stores, and mail service. Outlets within the non-retail market include clinics, non-federal hospitals, federal facilities, HMOs, long-term care facilities, home health care, and other miscellaneous settings.

#### **QuintilesIMS, Total Patient Tracker (TPT)**

Total Patient Tracker (TPT) is a national-level projected audit designed to estimate the total number of unique patients across all drugs and therapeutic classes in the retail outpatient setting over time. TPT derives its data from the Vector One® database which integrates prescription activity from a sample received from payers, switches, and other software systems that may arbitrage prescriptions at various points in the sales cycle. Vector One® receives over 2.1 billion prescription claims per year.

### 8.2 APPENDIX B. FDA ADVERSE EVENT REPORTING SYSTEM (FAERS)

#### **FDA Adverse Event Reporting System (FAERS)**

The FDA Adverse Event Reporting System (FAERS) is a database that contains information on adverse event and medication error reports submitted to FDA. The database is designed to

support the FDA's post-marketing safety surveillance program for drug and therapeutic biologic products. The informatic structure of the database adheres to the international safety reporting guidance issued by the International Conference on Harmonisation. Adverse events and medication errors are coded to terms in the Medical Dictionary for Regulatory Activities (MedDRA) terminology. The suspect products are coded to valid tradenames or active ingredients in the FAERS Product Dictionary (FPD).

FAERS data have limitations. First, there is no certainty that the reported event was actually due to the product. FDA does not require that a causal relationship between a product and event be proven, and reports do not always contain enough detail to properly evaluate an event. Further, FDA does not receive reports for every adverse event or medication error that occurs with a product. Many factors can influence whether or not an event will be reported, such as the time a product has been marketed and publicity about an event. Therefore, FAERS data cannot be used to calculate the incidence of an adverse event or medication error in the U.S. population.

**8.3 APPENDIX C. FAERS CASE NUMBERS, FAERS VERSION NUMBERS AND MANUFACTURER CONTROL NUMBERS FOR THE PEDIATRIC CASE SERIES WITH DRUG (N=19)**

<b>FAERS Case Number</b>	<b>Version Number</b>	<b>Manufacturer Control Number</b>	<b>FAERS Case Number</b>	<b>Version Number</b>	<b>Manufacturer Control Number</b>
4133097	3	04P-056-0256843-00	8141936	2	2011SP039010
6024455	2	2006-03-1317	8226215	1	1000021173
6227655	1		8272738	2	US-GLAXOSMITHKLINE-A0956061A
7065571	1		9011191	1	US-009507513-1004USA01554
7179539	1	2009SP031666	9175093	1	2011SP057418
7661385	1	2010SP054135	10029550	1	
7987690	1	WAES 1005USA00642	10483751	1	
8054307	1	2011SP031265	12746698	3	US-009507513-1609USA004832
8125210	1	2011029457	12959637	1	
8125211	1	2011029461			

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