Cost Efficiency of Intranasal Corticosteroid Prescribing
Patterns in the Management of Allergic Rhinitis

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ABSTRACT

BACKGROUND: Effective treatment of seasonal or perennial allergic rhinitis often requires use of topical intranasal corticosteroids (INSs). Despite differences in recommended starting dosages, the 4 leading INSs by market share are packaged in bottles containing 120 metered-dose sprays.

OBJECTIVE: To determine the relative prescribed dosages of the leading INSs and compare economic differences resulting from these prescribing behaviors.

METHODS: The IMS National Disease and Therapeutic Index (NDTI) was used to identify prescribing habits for the 4 leading INSs: fluticasone propionate nasal spray (FPNS), mometasone furoate aqueous nasal spray (MFNS), triamcinolone acetonide aqueous nasal spray (TANS), and budesonide aqueous nasal spray (BANS). The NDTI uses a national, randomly drawn, 2-stage stratified cluster-sampling methodology. Physicians are sampled during the first stage, with 2 workdays per month subsampled from each physician in the second stage. Each physician reports on all patient contacts during the 2 consecutive days, offering a continuing compilation of statistical information about patterns and treatment of disease encountered by office-based physicians. In a given month, the NDTI reports on 1,180 unique physicians.

RESULTS: From January 1, 2002, to December 31, 2002, 58% of prescriptions for FPNS were for 4 sprays daily with 37% for 2 sprays daily, MFNS: 44% for 4 sprays and 52% for 2, TANS: 65% for 4 sprays and 31% for 2, and BANS: 29% for 4 sprays and 68% for 2. These equated to mean prescribed daily dosages of 3.47 sprays per day for FPNS, 3.33 for MFNS, 3.50 for TANS, and 2.73 for BANS. Because each INS is packaged in a bottle with 120 metered-dose sprays, the differences in dosage offer varying days of supply per unit filled. BANS offered the most days of treatment (44 days), followed by MFNS (38 days) and FPNS and TANS (means of 35 and 34 days, respectively) per single prescription filled. Cost per day of treatment was calculated by multiplying the prescribed dosage with the average wholesale price of the products. BANS had the lowest cost per day of treatment at $1.54, with each other INS costing at least an additional $0.26 daily (MFNS $1.80; FPNS $1.88; TANS $1.97).

CONCLUSION: Based on physician prescribing patterns of INSs from the NDTI database, BANS offers more days of treatment at a lower cost per day than other leading INSs.

KEYWORDS: Allergic rhinitis, Intranasal corticosteroids, Budesonide, Fluticasone propionate, Mometasone furoate, Triamcinolone acetonide, Prescribing patterns, Cost-efficiency, Model simulation

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Allergic rhinitis (AR) is a highly prevalent disease, affecting 20 to 40 million people in the United States annually. The economic burden of AR is large, with estimates as high as $5.5 billion1 and $7.7 billion2 for total direct and indirect costs associated with this disease. Much of the direct costs are due to prescription medication use and ambulatory care. For example, prescriptions for antihistamines and intranasal corticosteroids (INSs) in 1999 exceeded $3 billion and $1 billion, respectively.3 It has also been reported that approximately 80% of indirect costs are attributed to time lost from work, and 17% of these costs are attributed to at-work productivity loss.4 These numbers point out the tremendous economic burden of AR and the importance of identifying the most cost-effective treatment for this condition.

Currently, many medical treatments are available for the treatment of AR, including oral decongestants, sedating antihistamines, second-generation non-sedating antihistamines, mast cell stabilizers, INSs, leukotriene receptor antagonists (LTRAs), nasal anticholinergics, and immunotherapy. In this era of limited health care economic resources, it is vital to distinguish which therapy for AR is most clinically effective and cost effective.

In terms of drug classes, antihistamines and INSs have been the cornerstones of therapy and are the most prevalent medications used to treat the symptoms of AR.5 The most recent medication class to be approved for treatment of AR is the LTRAs; however, a recent review found that they were no more effective than less-sedating antihistamines and were less effective than INSs for treatment of AR.6 Several reviews and meta-analyses7–8 have found that INSs are more effective than oral and topical antihistamines in reducing the symptoms of AR, in particular nasal blockage.

Although recently established guidelines by the World Health Organization in collaboration with the Allergic Rhinitis and Its Impact on Asthma (ARIA) Workshop have classified INSs as the most effective pharmacologic treatment of AR,9 they still recommend antihistamines as first-line treatment for mild intermittent symptoms of AR. Antihistamines and INSs, in no preferred order, can be used as first-line treatment for moderate to severe intermittent symptoms or mild persistent symptoms of AR. For the treatment of moderate to severe persistent symptoms of AR, only INSs are recommended as first-line treatment.10,11

If INSs are chosen for treatment, the next step is to determine which INS to use and the appropriate dosing. It would be important to know which INS of the many that are currently available is the most clinically effective and most cost-efficient product. There are 6 INSs currently available for treatment of AR: fluticasone propionate nasal spray (FPNS, Flonase), mometasone furoate nasal spray (MFNS, Nasonex), triamcinolone acetonide nasal spray (TANS, Nasacort), budesonide aqueous nasal spray (BANS, Rhinocort Aqua), beclometasone dipropionate (Beconase AQ), and flunisolide (Nasalide and Nasarel, generic flunisolide).
Clinical studies and comparison trials have found that all of these INSs demonstrate approximately the same level of efficacy for treating the symptoms of AR. They have also been found to be safe and generally well tolerated.

Of these INSs, FPNS, MFNS, TANS, and BANS are the leading INSs by market share (approximately 96% of the market). All 4 of these INSs are dispensed in bottles containing 120 metered-dose sprays. However, the recommended once-daily adult starting dosage, based on manufacturer’s prescribing information, varies: FPNS is 2 sprays per nostril (200 µg total dose), MFNS is 2 sprays per nostril (200 µg total dose), TANS is 2 sprays per nostril (220 µg total dose), and BANS is 1 spray per nostril (64 µg total dose). Because of these differences, there may be an economic advantage of certain INSs over others based on actual prescribing patterns.

Access to a centralized database containing physician-reported patient data would provide the necessary records for examination of prescription and drug utilization information as it pertained to specific products and diseases. The National Disease and Therapeutic Index (NDTI) database is one such database that provides data on how products are actually being prescribed in clinical practice to help determine prescribing patterns and identify utilization. Modeling monetary units onto the data results generated from the NDTI on the 4 leading INSs can provide information about real-world prescribing patterns and treatment costs for each product. Economic differences identified between the 4 leading INSs can then be evaluated to help establish the efficiency frontier for AR (for a detailed description, see Part I of this supplement), providing a value-based strategy for the treatment of AR.

The aim of this study was to determine the relative prescribed dosages of the leading INSs and to compare economic differences resulting from these prescribing behaviors.

### Methods

NDTI, a product of IMS Health, was used to identify prescribing patterns for the 4 leading INSs by market share: FPNS, MFNS, TANS, and BANS.

#### National Disease and Therapeutic Index

The NDTI database has been available since 1958 and continually updates and compiles statistical information about patterns and treatment of disease encountered by office-based physicians. Information is gathered from all primary specialties involved in direct patient care.

The NDTI panel of physicians currently consists of more than 3,600 physicians in a variety of therapeutic areas. Of these physicians, there are currently 150 participating allergists who are primary specialists within allergy, allergy and immunology, immunology, and pediatric allergy. These physicians are drawn from 9 different census regions: New England and Middle Atlantic (East), East North Central and West North Central (Midwest), South Atlantic, East South Central, West South Central (South), and Mountain and Pacific (West).
The NDTI database uses a national, randomly drawn, 2-stage stratified cluster-sampling methodology. During the first stage, a sample population of physicians is generated from American Medical Association and American Osteopathic Association physicians who are recruited for participation based on location and therapeutic specialty. In the second stage, 2 workdays per month are sampled from each physician. All patient contact during the 2 consecutive days is reported by each physician. In a given month, the NDTI database reports on 1,180 unique physicians, and data are collected on at least 2,454 workdays. Some of the information this database provides includes information about current and long-term trends in drug therapy/utilization, medical conditions for which they are prescribed, and drug profiles, patient profiles, and physician profiles. The NDTI database also has the capacity to estimate the actual number of patients using a precise product for a specific disease.

**Prescribed Dosage Analysis**

The number of days of treatment was calculated by taking the number of metered sprays in each INS bottle (120 for all 4 INSs) divided by the actual NDTI provider data from prescriptions written to evaluate the mean number of days of treatment per prescription by product.

**Model Simulation**

A model simulation was run based on prescriber-reported dosing generated from the IMS NDTI from January 1, 2002, to December 31, 2002. The scenario run used the average wholesale price (AWP) of the INSs based on prices reported by First Data Bank as of January 15, 2003. The model scenario reports results in cost per product per day. Since the 4 leading INSs are indicated for treatment of both perennial and seasonal AR, treatment lengths vary by patient and by disease severity. For this reason, a more accurate population cost metric is cost per treated day.

The models are based on cost only and do not provide information on the efficacy and safety of the INS products evaluated.
The efficacy and safety of these products have been reviewed in the literature and found to be similar.\textsuperscript{8,10,12,13} Key model assumptions were that (1) results from the NDTI can be generalized to the target population and (2) utilization of products is equal to prescribed doses.

**Cost Analysis**

The cost per day per dosage (cost per 2, 4, and 8 sprays daily) was calculated from the AWP for INS dosages per spray bottle. For example, the cost per day for a 2-sprays-per-day dosage = AWP/(sprays per bottle/2). The cost per day of each INS (calculated from the patients in which the prescribed dosage was known [>90% of patients]) = (percentage of patients prescribed 2 sprays daily x cost per day for 2 sprays) + (percentage of patients prescribed 4 sprays daily x cost per day for 4 sprays) + (percentage of patients prescribed 8 sprays daily x cost per day for 8 sprays).

**Results**

**Prescriptions Written**

The actual provider data from prescriptions written examines real-world prescribing habits. The percent of patients who received written prescriptions for BANS, FPNS, MFNS, and TANS by dosages are shown in Figure 1. The mean prescribed sprays per day for BANS (2.75) was less than for FPNS (3.47), MFNS (3.14), and TANS (3.57). BANS patients were prescribed the lowest starting dosage of 1 spray per nostril each day more often than the other leading INSs. Evaluation of the mean days of treatment supply per prescription showed that BANS provided the greatest number of treatment days, as written most commonly by physicians in the NDTI database, per bottle compared with FPNS, MFNS, and TANS (Figure 2).

**Cost Analysis**

The AWP of each of the 4 leading INSs as of January 15, 2003, was $65.01 for FPNS, $68.73 for MFNS, $66.21 for TANS, and $67.29 for BANS. The cost per day by dosage is similar for all 4 INSs; however, when the actual percentage of patients who were prescribed each dosage is factored into the model scenario (Figure 3), at $1.54 per day, BANS was found to have the lowest cost per day of treatment compared with FPNS, MFNS, and TANS (Figure 4). The mean cost per day for FPNS, MFNS, and TANS was at least $0.26 more than for BANS.

**Discussion**

Although all 4 leading INSs come in a bottle containing 120 metered-dose sprays, prescription duration varies because the prescribed daily dosage of these products varies. While the acquisition cost of these bottles is similar, when actual prescribed dosages and percentage of patients actually prescribed these dosages were factored into the model scenario analysis, differences in the costs per treated day were revealed. BANS patients were prescribed the lowest possible dosage of 1 spray per nostril more often than the other 3 INSs investigated. Because all 4 INS bottles contain the same number of metered-dose sprays (120), BANS provides more days of treatment supply per prescription than the other INSs, which leads to a lower cost per day of treatment.

This is an important result since patients and physicians are faced with numerous options for treating AR; however, in the current economic climate, where health care resources are limited, there is a need to evaluate the best option for maximizing benefit per unit cost. The results of this cost analysis, or cost-minimization analysis (analysis to determine lowest cost alternative when the consequences of treatment, efficacy and safety, are equivalent),\textsuperscript{17} show that even for products with similar efficacy and safety profiles, potential economic differences do exist.

As described in Part I of this supplement, the information from this cost-minimization analysis can be applied to develop an efficiency frontier for AR to help in making value-based treatment decisions. This is of particular importance given that the 4 leading INSs have been shown repeatedly to have similar safety and efficacy profiles and differ primarily on sensory attributes (i.e., taste, scent).\textsuperscript{18-21} Awareness of the economic differences of these products in addition to patient preference could lead to more cost-efficient prescribing patterns for the management of AR.

It is important to note that the model scenarios in this study were based solely on the prescribing behaviors reported through the NDTI and on AWP prescription costs as reported by First Data Bank. Although we were able to successfully identify prescribing patterns, we did not have any patient-level data on the rationale for
treatment selection, patient history, or diagnosis. This study also used cost per day as the economic unit of comparison among products versus other cost-unit measures. This study evaluated INS prescriptions for all patients with AR and did not separate patients into subgroups by type of symptoms, disease severity, or duration. Thus, the cost-per-day unit of measure appeared most appropriate. For future comparisons of products, depending on the patient population and other pertinent variables of the products, a different economic unit of measure may be more appropriate.

Conclusion

Evaluation of INS prescribing patterns shows that patients are prescribed the lowest starting dosage of BANS (1 spray per nostril daily) more often than the other 3 leading INSs. In addition, results of the model scenario show that BANS had the lowest daily cost for the treatment of AR compared with FPNS, MFNS, and TANS.

DISCLOSURES

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REFERENCES