Effective when a willingness to pay (WTP) was $33,000/QALY or less and TIO + SFC was more cost-effective when a WTP exceeded that threshold. The cost-effectiveness was also sensitive to changes in several variables including the mortality rates and utilities associated with TIO + SAL and TIO + SFC, as well as the hospitalization rate associated with TIO + SAL. 

CONCLUSION: When monotherapy with TIO is not effective to control moderate to severe COPD, adding SFC rather than SAL appears to be a more reasonable approach from a cost-effectiveness standpoint in the US health care system. However, the results were sensitive to changes in several key variables.

**Abstracts**

**PRS13**

**PEDIATRIC ASTHMA: AN EMPLOYER PERSPECTIVE ON ANNUAL EMPLOYEE AND DEPENDENT COSTS FOR MEDICAL CARE AND PRESCRIPTION DRUGS**

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**OBJECTIVE:** Management of pediatric asthma is known to be very costly. However, little is known about the costs to the parent. We aimed to objectively assess employee and dependent costs for employees with children with asthma (EWCWA) compared with employees with children without asthma (EWCWOA).

**METHODS:** A retrospective analysis was conducted using multiple US-based employers’ data from 2001 to 2007. Data included medical claims, pharmacy claims, payroll, work absence, and demographics. Asthma diagnosis (ICD-9 codes 493.xx) or pharmacy claims for an asthma controller medication were used to identify employees with asthmatic dependents aged <12 years for the EWCWA cohort. Employees in the EWCWOA cohort were identified based on dependent age and lack of an asthma diagnosis (ICD-9 code) or pharmacy claim for a controller medication. The index date in the EWCWA cohort was defined as the date of first asthma diagnosis during 2001 or later; the first pediatric medical or pharmacy claim date was used in the EWCWOA cohort. All costs were adjusted to 2007 dollars and incremental costs (EWCWA—EWCWOA) were calculated using two-part regression models and presented for demographics, job information, Charlson Co-morbidity Index, and geographic region. **RESULTS:** Data were available for the EWCWA (dependent age <4 yr: n = 4577; 4–7 yr: n = 4343; 8–11 yr: n = 3954; total <12 yr: n = 11,794) and EWCWOA (dependent age <4 yr: n = 32,558; 4–7 yr: n = 28,017; 8–11 yr: n = 27,863; total <12 yr: n = 64,812) cohorts. The incremental annual costs (EWCWA—EWCWOA) for employees and dependents (health care/ prescriptions), respectively, were: dependent age <4 yrs: -$56/$731 and $663/$568; 4–7 yrs: $199/$1091 and $904/$555; 8–11 yrs: $364*/$116† and $1081†/$586; <12 yrs: $154*/$95 and $662/$534 (**P < 0.05, †P < 0.01). **CONCLUSION:** Pediatric asthma results in significant additional costs for both employees and dependents.

**PRS14**

**BENEFITS FROM IMPROVED ASTHMA CARE IN FINLAND 1987–2005 ASSESSED WITH ANALYSIS OF COMPREHENSIVE SOCIETAL COST AND BEHAVIOUR OF COST DRIVERS**

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**OBJECTIVE:** The prevalence of chronic asthma has tripled during last two decades in Finland, but overall costs of disease management have not increased and patient level costs have decreased significantly. We analyzed with comprehensive time series all expenditures as well as the effectiveness of interventions such as the national action program (1994–2004) and development of pharmacotherapy. **METHODS:** Finnish registry based data from 1987 to 2005 was combined to evaluate all costs of asthma. These included comprehensive health care costs, sick-leave compensations, disability pensions, and loss of productivity; all converted to 2004 euros. Several scenarios were constructed to identify the important changes in care processes and cost drivers during this period. **RESULTS:** The number of patients with valid special reimbursement for asthma medication increased significantly (83,000 to 216,000) during the observation period yet the overall expenditure of care remained at the level of 1987, at €240 million. Cost of medications doubled during study period, but savings were achieved as other expenditures, mainly hospitalizations, and loss of productivity decreased by 50 to 75%. Treatment effectiveness increased as asthma related deaths, disability pensions, sick-leave payments and institutional care decreased significantly (50 to 70%). The cost-saving scenarios showed that a significant part (40%) of positive effects was attained by launch of new asthma drugs and asthma pipes from 1989 to 1994. The initiation of the national care programme with its focus on anti-inflammatory treatment from disease onset, improved diagnostics and more active self care further increased this positive trend. **CONCLUSION:** Comprehensive assessment of large patient cohorts and long term economical outcomes is a useful method for evaluation of outcomes in chronic diseases. Identification of different cost drivers is needed as the cost of new interventions is increasing and their benefits should ideally be assessed in relation to their broader societal influence.

**PRS15**

**THE BURDEN OF NASAL CONGESTION IN THE UNITED STATES**

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**OBJECTIVE:** The prevalence and costs of allergic rhinitis (AR) in the United States are estimated to be very high. Recently, research has reported that not all AR symptoms are of equal importance to patients. In particular, evidence is mounting that nasal congestion is the most bothersome symptom of AR and thus may account for most of the burden of illness. However, unlike AR which has an ICD-9-CM code thus facilitating estimates of burden of illness, the cost of nasal congestion must be obtained indirectly. The purpose of the present analysis is to estimate the national costs of AR that are attributable to nasal congestion. **METHODS:** Data come from a recent national study of the effect of AR symptoms on patients’ lives (e.g., sleep, daytime somnolence, mood, and work and school productivity). These relative effects of nasal congestion were then applied to U.S. cost estimates derived from the literature and a national employer claims database to estimate some of the economic burden of AR that could be attributed to nasal congestion. **RESULTS:** Results suggest that almost three-fourths of the cost associated with burden of illness related to AR is attributable to nasal congestion. Thus, approximately $3.4 billion of the $4.8 billion in direct costs for AR and approximately $3.1 billion of the $4.3 billion in indirect costs for AR can be attributed to nasal congestion. **CONCLUSION:** The direct and indirect costs attrib-
utable to nasal congestion are substantial. These high costs emphasize the importance of diagnosing and treating nasal congestion.

**PRS16**

**INCREMENTAL DIRECT MEDICAL EXPENDITURES ASSOCIATED WITH ADULT ASTHMA IN THE UNITED STATES**

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OBJECTIVE: To determine the incremental direct medical expenditures of treating adult asthma in the United States. METHODS: Retrospective analysis was conducted using the 2004 Medical Expenditure Panel Survey (MEPS) data. Adult asthma respondents (age ≥18 years; n = 1552) were identified as those with International Classification of Diseases (ICD)-9 diagnosis codes for asthma or those that self-reported as having asthma in 2004. Incremental total expenditures and expenditures for various categories of resource use, i.e., physician office visits, emergency room visits, outpatient visits, inpatient visits, medications and other medical expenses associated with asthma, were estimated using separate multivariate regression models. The models were adjusted for age, gender, race, ethnicity, education, marital status, geographic region, insurance status and comorbidities (using the Charlson comorbidity index). Given the skewed distribution of expenditure variables, multiple model specifications including ordinary least squares regression, generalized linear model (GLM) with Poisson, gamma and negative binomial variance functions were evaluated. RESULTS: The prevalence of current asthma among adults in 2004 was estimated at 6.84%, i.e., 14.9 million persons (95% CI: 6.43% to 7.26%) in the United States. Individuals with asthma had 68% higher total expenditures than non-asthmatics after controlling for covariates (RR: 1.68; p < 0.0001). The annual adjusted mean incremental total expenditure associated with asthma was $1953.7 (SE: $300.1; p <0.0001) per person. Medications accounted for the largest proportion of the total expenditures estimated at $609.4 (SE: $32.0; p <0.0001), followed by physician office visits at $364.3 (SE: $86.9; p <0.0001) and inpatient visits at $297.3 (SE: $191.2; p = 0.074). CONCLUSION: Given the prevalence of adult asthma and its associated incremental expenditures, the annual direct medical expenditure for treating adult asthma is estimated at $29.2 billion in 2005 USD. This estimated incremental expenditure associated with asthma is more than twice the cost of asthma reported in previous studies.

**PRS17**

**ECONOMIC OUTCOMES IN PATIENTS WITH CYSTIC FIBROSIS: A REVIEW OF THE LITERATURE**

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OBJECTIVE: To review up-to-date economic outcomes data in patients with cystic fibrosis (CF), especially costs related to respiratory infection by Pseudomonas aeruginosa (Pa), the leading cause of morbidity and mortality in CF patients. METHODS: A systematic search of the MEDLINE database from 1990–2007 was conducted, using the terms “cystic fibrosis” and “cost.” Selected conference abstracts were also searched. Recent articles that contained economic data on antibiotic and mucolytic therapies were selected for in-depth review. RESULTS: In-depth review was performed on 27 articles that examined the economic impact of inhaled tobramycin (2 articles), the effect of home- vs. hospital-based antibiotic therapies for pulmonary exacerbations (4), economic impact of recombinant human deoxyribonuclease (rhDNase) (10), and cost-of-illness for CF (11). Inhaled tobramycin led to reductions in health care costs that offset 37%–57% of the drug cost. Home-based antibiotic therapy for exacerbations generally resulted in lower health care costs than hospital-based administration. Use of rhDNase led to reductions in health care costs that offset 17%–38% of the drug cost. Cost-of-illness studies have been conducted in 7 countries; the economic estimates varied widely ($9,000 to $64,000/patient/year; 2006 US dollars) due to differences in treatment patterns, health systems, methodologies, and subjects. Most cost-of-illness studies were retrospective observational studies of direct costs from the perspective of a hospital or third-party payer. The largest cost categories included hospitalizations, out-patient visits, rhDNase and antibiotics. Disease severity and Pa infection were major determinants of cost. CONCLUSION: Studies show that inhaled tobramycin and rhDNase partially offset medical costs; home-based antibiotic therapy likely reduces costs; and direct costs can be high but vary widely across countries and analytical methodologies. Areas for future research include direct comparisons of inhaled antibiotic therapies, examination of the relationship between treatment adherence and economic outcomes, and estimation of societal cost-of-illness.

**PRS18**

**COST-UTILITY ANALYSIS OF VARENICLINE, AN ORAL SMOKING CESSATION DRUG, IN JAPAN**

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OBJECTIVE: To conduct a cost-utility analysis by comparing two scenarios in Japan: smoking cessation counseling by a physician versus use of varenicline, an oral smoking cessation drug, in addition to counseling. METHODS: A Markov model was constructed to analyse life-time medical costs and Quality-Adjusted Life Years (QALYs) from the perspective of health care payers. In the Markov model, five years were set as one cycle. Both cost and utility were discounted at 3% annually. The cohort of smokers was classified by gender and age, and we assumed that smokers started smoking aged 20 years and received smoking cessation therapy aged 30, 40, 50, 60, or 70 years. The health care cost and QALYs were calculated throughout the term until 90 years. We chose three parameters for sensitivity analyses—success rate of varenicline, unit price of varenicline and discount rate. In the base-case analysis, success rates of varenicline and placebo were assumed to be 37.9% and 25.5%, respectively, in male smokers, and 22.2% and 16.1%, respectively, in female smokers, based on a randomized controlled trial conducted in Japan. We chose QALY for outcome measurement. Quality weight for each tobacco-associated disease was derived from the literature. RESULTS: It was shown that the scenario where varenicline was prescribed is more effective and less costly than giving smoking cessation counseling alone. Varenicline would save direct medical costs of JPY 26,000 (USD226, USD1 = JPY115) and increase 0.094 QALY in male smokers. Regarding the budget impact, varenicline is estimated to save JPY 23.7 billion (USD 206 million) of the medical costs for tobacco-associated diseases for the whole population. Sensitivity analyses suggested the robustness of the results. CONCLUSION: Varenicline, the first oral treatment for smoking cessation in Japan, is cost-effective and will contribute to the reduction of medical costs.