daily living limitations, supplemental insurance coverage and region. We also examined whether prescription drug coverage modified the difference in expenditures among enrollees with asthma. **RESULTS:** Medicare beneficiaries with asthma had higher mean Part A expenditures ($4412 versus $2744), longer average hospital stays (3.53 days versus 1.82), and higher Part B expenditures ($3688 versus $2547) than those without asthma. In regression analysis, asthma increased mean Part A expenditures by $850 and Part B expenditures by $551. Outpatient prescription drug coverage decreased Part B spending on persons with asthma by $446, but increased Part B spending by $243 for those without asthma. Prescription drug coverage had no effect on either Part A expenditures or the number of days spent in the hospital for either those with or those without asthma. **CONCLUSIONS:** Asthma increases expenditures in the Medicare program, but the increase is moderated by outpatient prescription drug coverage. This suggests that spending increases associated with the new Medicare prescription drug benefit may be mitigated by reductions in spending on chronic illnesses such as asthma. As the new drug benefit is designed, attention should be focused on the identification of medications that reduce overall Medicare spending to insure that they are covered by drug plans.

RI2

THE EXCESS COST OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE FROM A MANAGED-CARE PERSPECTIVE

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OBJECTIVE: To estimate the annual excess cost of chronic obstructive pulmonary disease (COPD) to a large managed-care plan. **METHODS:** This study employed a retrospective, matched cohort design and administrative claims data from the large multi-state managed care database. Patients selected were 35+ years of age, with a diagnosis of COPD in 2001, and eligible for medical and pharmacy benefits as of January 1, 2001. The comparison cohort consisted of patients without COPD matched on age, gender, geographic region, and insurance coverage type. The excess cost of COPD was estimated as the difference in mean health plan payments between the COPD and comparison cohorts during 2001. Multivariate techniques were employed to assess the contribution of mortality and comorbidity to excess costs. **RESULTS:** A total of 61,527 patients with COPD met study inclusion criteria, a prevalence of approximately 9%. Approximately 12% were diagnosed with emphysema, 25% with chronic bronchitis, and 63% with unclassified chronic airway obstruction. COPD patients and their matched controls (n = 61,527) averaged 71 years of age and 50% were female. Charlson comorbidities, especially vascular disease and cancer, were more common in the COPD cohort. The utilization of most types of services was significantly (P < 0.001) higher in the COPD group, including hospitalizations (43% vs. 14%), emergency room visits (47% vs. 21%), and home health-care services (28% vs. 8%). The annual per-patient excess cost of COPD from the health plan perspective was estimated to be approximately $7900 ($11,350 for the COPD cohort minus $3450 for the control cohort), 58% of which was due to hospitalizations. The higher burden of comorbidity and mortality in the COPD cohort accounted for about 40% of the observed difference in excess costs. **CONCLUSIONS:** The excess cost of COPD is substantial. Acute hospitalizations and greater comorbidity burden explain a large portion of these excess costs.

RI3

COST-EFFECTIVENESS OF INFLUENZA VACCINE IN 6–24 MONTH OLD CHILDREN

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OBJECTIVE: Recent guidelines have recommended that children aged 6–24 months should be immunized with influenza vaccine to protect against influenza. Our objective was to evaluate health outcomes and costs to society of influenza vaccination on influenza and acute otitis media infection in an otherwise healthy population of 6–24 month old infants. **METHODS:** Based on published and unpublished data, a decision analytical model comparing two strategies: children vaccinated with inactivated influenza vaccine and children not vaccinated children has been developed. The clinical pathway predicted the probability of becoming infected with influenza, developing acute otitis media in conjunction with influenza or alone. Health outcomes used in this model included days of illness as well as days of paid employment missed by primary caregiver. Costs incorporated into the model included both direct and indirect costs including cost of vaccination, pharmaceutical costs of treatment of infection, hospitalization, and caregiver employment income lost. Robustness of results was tested by univariate and multivariate sensitivity analysis. The model was used to simulate the results for an otherwise health population comparing vaccination to non-vaccination strategy of care. **RESULTS:** Vaccination programs had lower cost and better health outcomes when compared to non-vaccination programs. Vaccinated children had an expected cost to society of $329.51 with 2.29 expected days of illness and 1.93 days of work missed by the primary caregiver. Non-vaccinated children had an expected cost of $393.78 with 3.97 expected days of illness and 2.63 days of work missed by the primary caregiver. Univariate and multivariate sensitivity analysis showed these results to be robust in upholding vaccination as a cost effective alternative to no vaccination over a wide range of assumptions. **CONCLUSION:** Immunization with inactivated influenza vaccine is a cost effective treatment in reducing the incidence of both influenza and acute otitis media for children aged 6–24 months.

RI4

AN ECONOMIC ANALYSIS OF RAPID TESTS AND ANTIVIRAL TREATMENTS FOR INFLUENZA IN CHILDREN

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OBJECTIVE: This study evaluates the projected cost-effectiveness of antiviral treatments (amantadine or oseltamivir) with and without the use of influenza rapid tests in children. **METHODS:** A decision tree was developed to predict costs and health effects of 5 strategies: no antiviral treatment, empirical treatment with amantadine, empirical treatment with oseltamivir, testing then treatment with amantadine, and testing then treatment with oseltamivir. The target population was stratified by age (6–23 mos, 2 yrs, 3–4 yrs, 5–11 yrs, and 12–17 yrs) and risk status (high or low risk for influenza-related complications). Probabilities and costs (direct and opportunity) for uncomplicated influenza, influenza-like illness, outpatient visits, hospitalizations, deaths, effectiveness of antiviral treatments, treatment adverse events, and characteristics of influenza rapid tests were based on primary and secondary data. Quality adjust-

ments (time-tradeoff amounts) for influenza-related events were based on primary data from a telephone survey (n = 112). Incremental cost-effectiveness ratios in dollars per quality-adjusted life year (QALY) were calculated. **RESULTS:** For an unvaccinated population, the base case cost per QALY for empirical treatment with amantadine was less than $1000 for all subgroups and for empirical treatment with oseltamivir ranged from less than $1000 to $8000 depending on age and risk status. Results were sensitive to influenza illness rate, proportion of influenza-like illness that is confirmed influenza, and influenza vaccination status. Testing and treatment options were more costly and less effective than empirical treatment options. Probabilistic sensitivity analysis suggests that empirical treatment with amantadine has similar cost-effectiveness ratios under many scenarios while the cost-effectiveness ratios of empirical treatment with oseltamivir show wider variability. **CONCLUSIONS:** Empirical treatment with amantadine during peak influenza season is notably more cost-effective than empirical treatment with oseltamivir. Both reductions in test prices and improvement in accuracy of rapid influenza tests will be needed to make testing and treatment strategies attractive alternatives.

ARTHRITIS

AR1

ASSESSING THE COST-EFFECTIVENESS OF COX-2 SPECIFIC INHIBITORS FOR ARTHRITIS IN THE VETERANS HEALTH ADMINISTRATION

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OBJECTIVE: This study was designed to assess the cost-effectiveness of cyclooxygenase-2 specific (COX-2) inhibitors (rofecoxib and celecoxib) over non-selective non-steroidal anti-inflammatory drugs (NSAIDs) in high-risk arthritis patients from the perspective of the Veterans Health Administration (VA). **METHODS:** This literature-based economic analysis compared rofecoxib and celecoxib to NSAIDS in two arthritis patient populations considered at higher risk of developing clinically significant upper gastrointestinal events (CSUGIEs): 1) patients of any age with previous medical history of perforation/ulcer/bleed (PUB), and 2) patients 65 years and older (regardless of history of PUB). Two outcomes measures were reported 1) incremental cost per CSUGIE averted over 1 year, and 2) incremental cost per quality-adjusted life-year (QALY) gained, considering both the mortality and morbidity associated with gastrointestinal (including CSUGIEs) and cardiovascular-related adverse events. When possible, costs were modeled to reflect the VA perspective. Sensitivity analyses were conducted to test the robustness of the analysis. **RESULTS:** Compared to NSAIDS, rofecoxib and celecoxib increased costs but reduced the incidence of CSUGIE. Cost per CSUGIE avoided were $7,476 and $16,379 (in patients with a PUB history) and $14,294 and $18,376 (in patients aged > 65 years) for celecoxib and rofecoxib, respectively. In both populations, celecoxib was associated with a cost per QALY less than $50,000. In contrast, rofecoxib was found to cost more and result in a net QALYs loss, due in particular to the increase in the risk of cardiovascular complications, and was therefore considered cost-ineffective. Results were most dependent on assumptions about the incidence of cardiovascular events and CSUGIE and the COX-2 inhibitors acquisition price. **CONCLUSIONS:** This analysis suggests that the COX-2 inhibitors may be cost-effective from the perspective of the VA. However, cost-

effectiveness appears to depend less on the specific characteristics of the high-risk target population considered but more on the agent evaluated.

AR2

A COST-EFFECTIVENESS ANALYSIS OF BIOLOGICAL TREATMENTS FOR RHEUMATOID ARTHRITIS

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OBJECTIVE: The present study compared the cost-effectiveness of four biologics—adalimumab, anakinra, etanercept, and infliximab—used in the treatment of rheumatoid arthritis (RA). **METHODS:** A decision analytic model was constructed to estimate the costs and effectiveness of these biologics used alone or in combination with methotrexate (MTX) during one year, from the perspective of a managed-care organization. Direct costs consisted of drugs and health care resources. Effectiveness was measured by Quality-Adjusted Life Years (QALYs) based on preference weights and health states in which patients achieved one of four levels of response according to the American College of Rheumatology (ACR) response criteria (No ACR 20, ACR20, ACR50, ACR70) and had one of the four levels of adverse effects (no, mild, moderate, severe) due to their treatments. Drug costs were US average wholesale price. Costs for health care resources were those published by the Committee of Medicare and Medicaid Services and in the MEDSTAT DRG Guide. Preference weights were obtained from a survey on patients with RA in which visual analogue scale technique was used. Probabilities of health states were derived from published clinical trial reports. One-way sensitivity analyses were conducted on all variables to test for robustness of the model. **RESULTS:** Among monotherapies, the incremental cost-effectiveness ratio (ICER) of etanercept compared to anakinra (the lowest cost option) was $13,387 per additional QALY, while etanercept dominated adalimumab. Among combination therapies, the ICER of etanercept + MTX compared to anakinra + MTX was $7925 per additional QALY. Etanercept combination therapy dominated adalimumab and infliximab combination therapies. However, the costs of etanercept + MTX and adalimumab + MTX were almost equal. Results were sensitive to changes in treatment costs and probabilities of health states in directions as predicted. **CONCLUSIONS:** For monotherapy and combination therapy regimens, anakinra was the least expensive option while etanercept dominated other treatments.

AR3

REVALIDATION OF THE ORIGINAL CEDARS-SINAI RHEUMATOID ARTHRITIS HEALTH-RELATED QUALITY OF LIFE (CSHQ-RA) INSTRUMENT

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OBJECTIVE: This study reassessed the psychometric characteristics of the original 33-item CSHQ-RA instrument using a representative population of RA patients from 55 sites across the US. **METHODS:** Three hundred seven of 309 screened patients from a 24-week multicenter, open-label, single arm study of RA patients receiving anakinra completed the 33-item CSHQ-RA, the Medical Outcomes Study Short Form-36 (MOS SF-36) and the Stanford Health Assessment Questionnaire (HAQ)