METHODS: Modifiable prescribing practices may include recent physician’s visit occurring between January 1, 2010, and August 31, 2010. For patients who were on an ART regimen recommended by the Department of Health and Human Services (DHHS) 2011 Guideline, adherence was established for each patient within a 120-day period after the most recent physician’s visit occurring between January 1, 2010, and August 31, 2010. For patients who were on an ART regimen recommended by the Department of Health and Human Services (DHHS) 2011 Guideline, adherence was calculated based on pharmacy claims for 1 year after the end of the 120-day period. Logistic regression was used to examine the association between MPR ≥ 90% and age, sex, type of health plan, use of a single-tablet regimen (STR), inpatient and outpatient utilization, and direct health care costs. Adherence to ART regimens in patients with human immunodeficiency virus (HIV) infection. However, suboptimal adherence to ART may lead to disease progression and virologic failure. Earlier studies with combination ART demonstrated that as much as 90%-95% adherence was needed to prevent disease progression.

OBJECTIVE: To measure adherence to ART regimens in patients with HIV infection and analyze the clinical and demographic factors associated with ≥ 90% adherence.

METHODS: This study used retrospective claims data from a managed care organization (MCO). Members 18 years and older with an HIV diagnosis identified by medical claims were included in the cohort, and pharmacy claims were retrieved for these members. An ART regimen was established for each patient within a 120-day period after the most recent physician’s visit occurring between January 1, 2010, and August 31, 2010. For patients who were on an ART regimen recommended by the Department of Health and Human Services (DHHS) 2011 Guideline, adherence, as measured by medication possession ratio (MPR), was calculated based on pharmacy claims for 1 year after the end of the 120-day period. Logistic regression was used to examine the association between MPR ≥ 90% and age, sex, type of health plan, use of a single-tablet regimen (STR), inpatient and outpatient utilization, and direct health care costs.

RESULTS: Of the 4,547 adults with HIV diagnosis, 3,528 (77.6%) had received at least 1 ART. A DHHS-recommended ART regimen was identified in 2,377 patients with 1,136 (47.8%) receiving an STR. Mean MPR for patients on a DHHS-recommended ART regimen was 91.5 +/- 14.0 with 73.1% of patients having achieved MPR ≥90%. In univariate analyses, sex, number of outpatient visits, cost of inpatient care, and use of STR were significantly associated with MPR ≥90%. In multivariate analysis, only male sex (P = 0.027) and use of an STR (P = 0.009) were positively associated with MPR ≥90%. Patients on STR were 1.3 times more likely to achieve at least 90% adherence.

CONCLUSIONS: Adherence continues to be a challenge in patients with HIV. More than a quarter of patients who were on a DHHS-recommended ART regimen failed to achieve an accepted adherence MPR threshold of ≥90%. Modifiable prescribing practices may include using an STR, but other interventions to improve adherence are also needed.
the multivariable analyses, the preferred group had significantly lower adjusted hazards of nonpersistence (hazard ratio = 0.48, 95% CI = 0.44-0.52) and significantly greater adjusted odds of adherence ≥80% (odds ratio [OR] = 1.38, 95% CI = 1.07-1.77) and adherence ≥95% (OR = 1.26, 95% CI = 1.05-1.51). PPPM total health care expenditures were numerically lower for the preferred group (-$341, 95% CI = -$888-$255) but the difference did not reach statistical significance.

**CONCLUSIONS:** Compared with patients initiating nonpreferred ART, those initiating preferred ART regimens had longer durations of ART persistence, were more likely to adhere to their ART, and had similar PPPM total health care expenditures.

**SPONSORSHIP:** This research was conducted by Bristol-Myers Squibb, Plainsboro, NJ, without external funding.

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**Application of a Refill Reminder Program Aimed at Increasing Part D Plan Rating Medication Adherence Measures**

Leslie R, Chun-Wallace S, Huang J, Patel B. MedImpact Healthcare Systems, Inc., 10181 Scripps Gateway Ct., San Diego, CA 92131; scott.leslie@medimpact.com, 858-790-6685

**BACKGROUND:** Literature reviews of medication adherence interventions specify reminding patients of refills as one of the most effective methods of increasing medication adherence to maintenance medications. A member-based refill reminder program to address gaps in therapy for at-risk members was implemented for a health plan with poor ratings to the 3 adherence-based Centers for Medicare and Medicaid (CMS) Part D Patient Safety measures. Program components included a pill box delivery to all members plus letters and phone calls to targeted members.

**OBJECTIVE:** To (a) implement a refill reminder program aimed at increasing member adherence and (b) to assess the influence of the program to a Medicare Advantage prescription drug plan’s (case group) overall long-term adherence patterns and rates.

**METHODS:** Daily scans and analysis of a pharmacy claims database identified members late in refilling 3 classes of maintenance medications: Oral Diabetes (ODM), anti-hypertension (HTN), and cholesterol (CHOL). Letters in English and Spanish were prepared and sent daily to members late in refilling target medications by 7 days. Targeted members were monitored for refill status, and those not refilling within 7 days of first letter were sent a second refill reminder letter. Outbound telephone calls were made by care coordinators to those members who 7 days after the second letter refill reminder still had not refilled their prescriptions. Member and overall health plan adherence rates were measured pre- and post-intervention using proportion of days covered (PDC). Changes in adherence and number of members reaching adherence threshold (PDC ≥80%) were compared with another Medicare Advantage prescription drug plan (control group) with similar demographic characteristics not participating in the refill reminder program. Logistic regression was used to assess likelihood of reaching adherence post-intervention across groups while adjusting for baseline adherence rates.

**RESULTS:** A total 40,014 letters, at an average of 1,482 letters per week, were sent in the first 6 months post-implementation. Percentage of members refilling medication after the first and second letter was 14.9% and 21.3%, respectively. Adherence rates for the participating health plan increased 2.0%, 3.5%, and 4.0% from baseline for ODM, HTN, and CHOL, respectively. For all adherence-based CMS Part D Star Rating Measures, members in the case group were more likely to be adherent in the post-period than members in the control group: ODM (odds ratio [OR] = 1.407, 95% CI = 0.945-2.094), HTN (OR = 1.688, 95% CI = 1.318-2.163), CHOL (OR = 1.570, 95% CI = 1.236-1.995).

**CONCLUSIONS:** In this Medicare population, members benefited from a repetitive refill reminder program to improve adherence to targeted maintenance medications. Refill reminders may contribute to development of clinical programs intended to improve a health plan’s adherence-based Part D plan ratings.

**SPONSORSHIP:** This research was conducted by MedImpact Healthcare Systems, Inc., San Diego, CA, without external funding.

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**Assessment of Prescription Utilization Patterns with the Shifts of Medicaid FFS to Managed Care in New York, Kentucky, Ohio, and New Jersey**

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**BACKGROUND:** With the Affordable Care Act provisions to expand Medicaid eligibility and the DRE Act to extend the rebate program to managed Medicaid enrollees, states are incentivized to shift programs from fee-for-service (FFS) to managed Medicaid plans (MMC) and to carve-in pharmacy benefits. Kentucky shifted patients into MMC in November 2011; Ohio carved-in pharmacy benefits to MMC in October 2011; New York shifted patients and all pharmacy benefits into MMC in October 2011; and New Jersey shifted patients and carved-in all pharmacy benefits to MMC in June 2011.

**OBJECTIVE:** To evaluate the impact on patients when shifted to MMC and to determine if the MMC plans manage prescription benefits differently than FFS by trending the average prescription fills and identifying changes in product mix among patients in New York, New Jersey, Ohio, and Kentucky across 3 therapy areas: diabetes, respiratory, and antipsychotics.

**METHODS:** This retrospective analysis utilized the IMS longitudinal patient data for January 2010 to June 2012. Patients were selected if they filled a prescription for a diabetes, respiratory, or antipsychotic drug that was billed to payers as Medicaid FFS or MMC. Patients with Medicare Part D prescriptions were excluded, and the remaining sample was divided into 11 cohorts based on the timing of prescription fills and the timing of the respective state policy change. This study describes patients in FFS during the entire study period (FFSx) and patients in FFS shifting to MMC (MMCx).

**RESULTS:** A total of 343,152 patients were analyzed. The table describes the state and therapy level changes in prescriptions per patient and percentage of brand utilization. MMCX patients had a 0% change in average prescriptions per patient. MMCX patients initiating therapy (12-month look back) in the post-period were less likely to be started on a branded product across states and therapy areas (62.8% MMCX compared with 55.9% FFSx). In the antipsychotics market, MMCX patients showed a 24.5% decline in brand utilization, compared with an 11.5% decline in FFSx patients among all states. Kentucky and New York showed the largest decrease in brand utilization among diabetes MMCX patients (Kentucky: -3.2%, New York: -7.8%). MMCX patients in New York and Ohio showed increases (New York: 5.3%, Ohio: 1.1%) in diabetic prescriptions per patient, whereas the FFSX diabetes cohorts had declines during the same time period (New York: -1.2%, Ohio: -3.8%). When examining the specific drugs that were filled among the New York diabetic MMCX cohort, a 13.5% increase was seen in use of metformin.

**CONCLUSIONS:** Each state showed different trends across therapy areas, demonstrating varied management tactics of the prescription benefit. Overall, MMC plans were able to provide access to the pharmacy benefit such that there was no disruption for patients when switched. Additionally, MMC plans have a more aggressive approach to brand utilization management when compared with FFS. For example, MMC plans were quicker in reacting to the patent loss of Seroquel in March...
2012. It remains to be determined if the MMC cohorts that saw an increase in overall prescriptions were due to disease and case management programs that promote compliance and adherence.

SPONSORSHIP: This research was conducted by IMS Health Incorporated and IMS Institute, Parsippany, NJ, without external funding.

Association Between Adherence to Generic Statin Therapy and Outcomes: Total Cost of Care and Medical Events over 2 Years

Gleason PP,* Qiu Y, Starner CI, Ritter S. Prime Therapeutics LLC, 1305 Corporate Center Dr., Eagan, MN 55121; pgleason@primetherapeutics.com, 612.777.5190

BACKGROUND: Previous research has found higher statin adherence associated with lower medical events but with higher total costs of care (TCC) due in part to brand statin costs. With the introduction of multiple generic statins, it is possible that members adherent to generic statins may have lower TCC. Minimal data is available quantifying outcome and cost differences in members adherent and nonadherent to generic statin medications.

OBJECTIVE: To examine the association between medication adherence and all-cause hospitalization or emergency room (ER) visits and compare TCC, medical costs, and pharmacy costs among individuals adherent and nonadherent to their generic statin therapies.

State and Therapy Area Results

<table>
<thead>
<tr>
<th>TABLE</th>
<th>State and Therapy Area Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average Prescription Per Patient</td>
</tr>
<tr>
<td></td>
<td>Pre-Policy Shift</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
</tr>
<tr>
<td>Kentucky (n = 2,222)</td>
<td>FFSx (n = 361)</td>
</tr>
<tr>
<td></td>
<td>MMCx (n = 1,861)</td>
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<tr>
<td>Ohio (n = 13,063)</td>
<td>FFSx (n = 2,238)</td>
</tr>
<tr>
<td></td>
<td>MMCx (n = 10,805)</td>
</tr>
<tr>
<td>New York (n = 16,286)</td>
<td>FFSx (n = 4,458)</td>
</tr>
<tr>
<td></td>
<td>MMCx (n = 11,828)</td>
</tr>
<tr>
<td>New Jersey (n = 4,403)</td>
<td>FFSx (n = 1,192)</td>
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<td></td>
<td>MMCx (n = 3,211)</td>
</tr>
<tr>
<td>Respiratory</td>
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</tr>
<tr>
<td>Kentucky (n = 24,481)</td>
<td>FFSx (n = 967)</td>
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<tr>
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<td>MMCx (n = 13,809)</td>
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<tr>
<td>Ohio (n = 86,411)</td>
<td>FFSx (n = 10,047)</td>
</tr>
<tr>
<td></td>
<td>MMCx (n = 76,364)</td>
</tr>
<tr>
<td>New York (n = 56,365)</td>
<td>FFSx (n = 13,365)</td>
</tr>
<tr>
<td></td>
<td>MMCx (n = 43,000)</td>
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<tr>
<td>New Jersey (n = 11,096)</td>
<td>FFSx (n = 2,702)</td>
</tr>
<tr>
<td></td>
<td>MMCx (n = 8,394)</td>
</tr>
<tr>
<td>Antipsychotics</td>
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</tr>
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<td>Kentucky (n = 5,903)</td>
<td>FFSx (n = 743)</td>
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<td>MMCx (n = 3,151)</td>
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<td>Ohio (n = 23,603)</td>
<td>FFSx (n = 6,800)</td>
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<td>MMCx (n = 16,803)</td>
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<td>New York (n = 15,031)</td>
<td>FFSx (n = 7,410)</td>
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<tr>
<td></td>
<td>MMCx (n = 7,615)</td>
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<tr>
<td>New Jersey (n = 6,358)</td>
<td>FFSx (n = 1,730)</td>
</tr>
<tr>
<td></td>
<td>MMCx (n = 4,602)</td>
</tr>
</tbody>
</table>

FFSx = patients in fee for service during the entire study period; MMCx = patients in fee for service shifting to managed Medicaid plans.

<table>
<thead>
<tr>
<th>TABLE</th>
<th>Association of 2-Year Costs of Care and Medical Events with Generic Statin Adherence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adherent (PDC ≥ 80%)</td>
</tr>
<tr>
<td></td>
<td>n = 10,126</td>
</tr>
<tr>
<td>2-Year Outcomes Assessment</td>
<td></td>
</tr>
<tr>
<td>Unadjusted all-cause hospitalization/ER visit</td>
<td>25.0%</td>
</tr>
<tr>
<td>All medical costs, $ (SD)</td>
<td>11,353 (6,814)</td>
</tr>
<tr>
<td>All pharmacy costs, $ (SD)</td>
<td>4,016 (3,912)</td>
</tr>
<tr>
<td>Total cost of care (medical and pharmacy), $ (SD)</td>
<td>15,290 (9,346)</td>
</tr>
</tbody>
</table>

*Hospitalization/ER visit rate compared by log-rank test and costs compared by GLM.

All medical costs are allowed amounts (plan and member paid) from all facility and professional claims including office visits, hospitalizations, procedures, laboratory testing, and ancillary. Medical costs plus pharmacy costs do not sum to total cost of care due to multivariate modeling using GLM with gamma log link. ER = emergency room; GLM = generalized linear model; PDC = proportion of days covered; SD = standard deviation.
METHODS: Retrospective pharmacy and medical claims data from a 1.2 million member commercial plan was used to identify members continuously enrolled from 2007 through 2010. Each member’s first 2008 medical encounter was defined as the index date. Members were required to have either two separate hypercholesterolemia (HC) office visits or an HC-related hospitalization in 2008 and have a statin supply on index date or a high risk condition diagnosis in the prior year. High risk conditions were defined as diabetes mellitus (DM), coronary artery disease (CAD), embolic stroke, or peripheral vascular disease (PVD). All members were followed for 2 years after their index dates and were required to have a >80% generic statin claim fill rate. In the 2-year follow-up, all statin claims were assessed to identify members as adherent (proportion of days covered [PDC] ≥80%) or nonadherent (PDC <80%). All medical and pharmacy claim total allowed amounts were summed to determine TCC. The Kaplan-Meier method was used for hospitalization/ER rate calculation, and association with adherence was analyzed using a Cox proportional hazard regression model with adjustment for age, gender, zip code-derived income, Charlson comorbidity score, existence of baseline depression or bipolar disorder, DM, CAD, PVD, or embolic stroke. Cost analyses were performed using the generalized linear model with gamma log link and adjusted for the same covariates.

RESULTS: Of the 21,910 members meeting all inclusion criteria, 10,126 (46.2%) were adherent, and 11,784 (53.8%) were nonadherent during the 2-year follow-up. The adherent group had a significantly lower hospitalization/ER visit rate (hazard ratio of 0.87, 95% CI, 0.82 to 0.92). Multivariate cost modeling found individuals in the adherent group had significantly lower medical costs ($1,022), higher pharmacy costs $937, and lower TCC ($161).

CONCLUSIONS: In this 2-year study, individuals adherent to generic statin medication had an associated unadjusted 2.6 percentage point lower hospitalization/ER visit rate, which remained significantly lower in the multivariate Cox model. The significantly lower medical costs offset the higher pharmacy costs resulting in significantly lower TCC.

SPONSORSHIP: This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

## Budget Impact of the Introduction of a Low Dose Levonorgestrel-Intrauterine System from a U.S. Third-Party Payer Perspective


**BACKGROUND:** Contraceptives vary by effectiveness, duration of effect, and the total costs related to the method used and unintended pregnancies (UP). Health care payers and women incur higher initial costs for long-acting reversible contraceptives, such as intrauterine contraceptives and implants, than for short-acting reversible contraceptives, such as oral contraceptives (OC). When making coverage decisions for contraceptives, health care payers should take into consideration both product- and pregnancy-related costs over the entire time of contraceptive use.

**OBJECTIVE:** To estimate the impact on the cost to a U.S. health care plan over 3 years when switching women from OCs to a low dose levonorgestrel-intrauterine system (LNG-IUS-12).

**METHODS:** A budget impact model was designed to estimate the cost before and after the availability of LNG-IUS-12, over a 3-year time horizon, among females 15-44 years at risk of UP, covered by a health plan. U.S. Census and National Survey of Family Growth data were used to determine the number of women aged 15-44 currently using or requiring contraception. Pregnancy outcomes (i.e., live births, induced and spontaneous abortion, ectopic pregnancy), risk of UP, discontinuation rates, and typical failure rates were estimated using published literature. It was assumed that LNG-IUS-12 garnered 0.5% of the contraceptive market in the first year, an additional 0.3% in the second year, and 0.2% in the third year, resulting in 1% of the contraceptive market at year 3, with LNG-IUS-12 taking direct market share from branded and generic OCs. The model incorporated costs for contraceptives, related physician visits, and pregnancy outcomes from method failures. Pharmacy costs were derived from Wolters Kluvers Health-MediSpan Master Drug Database; medical care costs were gathered from Medicare Reimbursement Rate for physicians; and the pregnancy costs were obtained from the Health Care utilization Project. Model outputs were reported as cost per plan, per member, per patient, or per member per month (PMPM), as well as the number of UP. All costs accrued in years 2 and 3 were discounted at 3%. A scenario analysis assessed the impact of potential first-year discontinuation rates for LNG-IUS-12, allowing for a 20% switch from LNG-IUS-12 back to OC.

**RESULTS:** In a hypothetical cohort of 1 million plan members, the base case model, with no allowance for discontinuation, estimated a reduction in total costs of $516,166, in PMPM costs of $0.04, and in UP 153. When first-year discontinuation of LNG-IUS-12 was considered, the model estimated a decrease in total costs of $381,032, in PMPM costs of $0.03, and in UP 153. These results were based on an estimated LNG-IUS-12 uptake of 1% of the total contraceptive market taken from UP users over a 3-year time horizon in women at risk for pregnancy.

**CONCLUSIONS:** Switching contraceptive users from OC to LNG-IUS-12 in a U.S. health care plan may result in less UP and an overall cost savings to the plan.

**SPONSORSHIP:** This research was conducted by IMS Health Incorporated, Parsippany, NJ, and Bayer Healthcare Pharmaceuticals, Wayne, NJ, without external funding.

## Burden of Secondary Cardiovascular Disease in Commercial and Medicare Patients: A Managed Care Perspective

Carlton R, Clark R, Regan TS,* Xcenda, 4114 Woodlands Pkwy., Palm Harbor, FL 34685; Tim.Regan@xcedena.com, 727.771.4129

**BACKGROUND:** The overall cost of secondary cardiovascular events in patients with a history of coronary heart disease (CHD), transient ischemic attack (TIA), or ischemic stroke represents a significant financial burden on managed care. Despite the American College of Cardiology (ACC)/American Heart Association (AHA) guideline recommendations to start aspirin therapy and continue indefinitely in all patients unless contraindicated, aspirin remains underutilized.
OBJECTIVE: To characterize the financial burden of secondary cardiovascular disease and its long-term complications in patients at risk for a secondary cardiovascular event.

METHODS: An economic model yielding the annual secondary cardiovascular disease cost burden was constructed using literature-based population, medication discontinuation/nonadherence, and cardiovascular event incidence data. Secondary cardiovascular disease patients were allocated to treatment either with aspirin, aspirin plus proton-pump inhibitor (PPI), or no aspirin. Secondary events were calculated based on annual recurrence rates adjusted for treatment discontinuation/nonadherence. The treatment cohort cost per member and total cost, along with the overall annual secondary cardiovascular disease expense to the plan, were determined based on AWP/MAC drug pricing and published discharge data for cardiovascular and gastrointestinal events.

RESULTS: A commercial plan with 1 million lives had an estimated 68,276 members who were considered to have secondary cardiovascular disease (26,753 who had experienced a stroke or TIA; 41,523 who had CHD). A Medicare population with 1 million lives had an estimated 295,711 members who had secondary cardiovascular disease (124,451 stroke or TIA members, 171,260 CHD members). Of those members with secondary cardiovascular disease, 14.8% did not take any aspirin therapy, while 70.7% took aspirin (25.6% used aspirin alone, and 45.1% used aspirin + PPI). The remaining 14.5% of patients on an antplatelet other than aspirin with or without an anticoagulant were not the focus of this analysis and were excluded. The cost per commercial plan member per year for those in the aspirin cohort was $852; aspirin + PPI was $749, and no aspirin was $940, yielding an overall secondary cardiovascular disease expense of $47.4 million to the plan.

The Medicare population was more expensive at an overall secondary cardiovascular disease expense of $202.8 million, or $863, $718, and $953 per member per year for the aspirin, aspirin+PPI, and no aspirin cohorts, respectively.

CONCLUSIONS: Prevention of secondary cardiovascular events with aspirin + PPI compared with aspirin alone was associated with a net per-patient per-year cost decrease of $103 and $145 and a potential overall cost decrease of $1.8 million and $11.0 million for a commercial and Medicare plan, respectively.

SPONSORSHIP: This research was funded by Pozen Inc., Chapel Hill, NC.

### TABLE

#### Treatment Cohort Event Incidence Rates

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Recurrent Stroke %</th>
<th>Recurrent MI %</th>
<th>GI Hemorrhage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Population (n = 58,376)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin (n = 17,474)</td>
<td>2.81 (491)</td>
<td>2.29 (400)</td>
<td>2.13 (372)</td>
</tr>
<tr>
<td>Aspirin + PPI (n = 30,797)</td>
<td>2.60 (800)</td>
<td>2.08 (642)</td>
<td>1.00 (307)</td>
</tr>
<tr>
<td>No aspirin (n = 10,105)</td>
<td>3.41 (344)</td>
<td>2.74 (277)</td>
<td>1.45 (147)</td>
</tr>
<tr>
<td>Medicare Population (n = 255,833)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin (n = 75,683)</td>
<td>2.96 (2,242)</td>
<td>2.23 (1,684)</td>
<td>2.13 (1,612)</td>
</tr>
<tr>
<td>Aspirin + PPI (n = 133,385)</td>
<td>2.75 (3,667)</td>
<td>2.02 (2,695)</td>
<td>1.00 (1,329)</td>
</tr>
<tr>
<td>No aspirin (n = 43,765)</td>
<td>3.59 (1,573)</td>
<td>2.66 (1,160)</td>
<td>1.45 (635)</td>
</tr>
</tbody>
</table>

GI = gastrointestinal; MI = myocardial infarction; PPI = proton pump inhibitor.

### TABLE

#### Cost Efficacy Ratio for ACR Responses in the AMPLE Trial

<table>
<thead>
<tr>
<th>ACR Response</th>
<th>SC abatacept + MTX</th>
<th>Adalimumab + MTX</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACR20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Months ($)</td>
<td>11,398</td>
<td>9,965</td>
</tr>
<tr>
<td>6 Months ($)</td>
<td>20,759</td>
<td>18,732</td>
</tr>
<tr>
<td>12 Months ($)</td>
<td>42,286</td>
<td>39,295</td>
</tr>
<tr>
<td>ACR50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Months ($)</td>
<td>21,143</td>
<td>18,265</td>
</tr>
<tr>
<td>6 Months ($)</td>
<td>33,997</td>
<td>30,045</td>
</tr>
<tr>
<td>12 Months ($)</td>
<td>59,310</td>
<td>53,000</td>
</tr>
<tr>
<td>ACR70</td>
<td></td>
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<tr>
<td>3 Months ($)</td>
<td>39,597</td>
<td>31,862</td>
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<tr>
<td>6 Months ($)</td>
<td>64,932</td>
<td>55,318</td>
</tr>
<tr>
<td>12 Months ($)</td>
<td>93,840</td>
<td>80,121</td>
</tr>
</tbody>
</table>

ACR = American College of Rheumatology; AMPLE = Abatacept Versus Adalimumab Comparison in Biologic Naive RA Subjects with Background Methotrexate. SPONSORSHIP: This research was funded by Pozen Inc., Chapel Hill, NC.

Khanna D, Massarotti E, Rosenblatt L, Hebden T.* Bristol-Myers Squibb, 777 Scudder Mill Rd., Plainsboro, NJ 08536; Tony.Hebden@bms.com, 609.897.3418

BACKGROUND: Several different classes of biologic agents are currently approved to treat adult patients with rheumatoid arthritis (RA) who responded inadequately to methotrexate (MTX). While numerous cost analyses for biologics have been performed, to date no study has compared the cost-effectiveness of biologics using data from a head-to-head trial of these agents. Here, we report the results of a comparative cost-effectiveness analysis from AMPLE (Abatacept Versus Adalimumab Comparison in Biologic Naive RA Subjects with Background Methotrexate), the first head-to-head trial of biologics in RA patients with an inadequate response to MTX.

OBJECTIVE: To compare the cost-effectiveness of subcutaneous (SC) abatacept versus subcutaneous adalimumab using efficacy endpoints from the AMPLE trial.

METHODS: AMPLE is a noninferiority trial comparing the efficacy of SC abatacept versus adalimumab in adult men and women with RA for ≤ 5 years and moderate to high disease activity as defined by DAS28-CRP (≥ 3.2) at screening, despite treatment with background methotrexate of at least 15 mg per week. A cost-effectiveness analysis was conducted to determine the cost per patient achieving a number of clinical and patient-reported (PRO) outcomes over 12 months. Twelve-month efficacy data including American College of Rheumatology (ACR) responses (ACR20, ACR50, and ACR70), remission (DAS28 < 2.6), physical function (defined as an improvement in Health Assessment Questionnaire [HAQ]-Disability Index score of ≥ 0.3 units), and activity limitation (captured using the Activity Limitation Questionnaire, which assesses the time over the previous 30 days that a patient had limitations in performing work or nonwork activities) were used for this analysis. The annual
cost of therapy of SC abatacept (125 mg weekly) and adalimumab (40 mg biweekly) was computed based on the wholesale acquisition costs per unit dose multiplied by frequency of administration per dosing. Cost of MTX was not included in the calculation because it was assumed to be the same for both treatments.

RESULTS: At the end of 1 year, the cost-efficacy ratio between SC abatacept and adalimumab for all ACR response rates was consistently comparable over time (table). The mean cost per remission (95% CI) was comparable between SC abatacept ($63,282 [$55,807-$73,265]) and adalimumab ($59,458 [$52,010-$69,203]). The cost per HAQ response was comparable between the two groups ($45,366 [$41,643-$49,820] and $43,707 [$39,923-$48,188] for SC abatacept and adalimumab, respectively; cost per day gained without activity limitation was also similar ($323 [$287-$369] and $332 [$291-387], respectively).

CONCLUSIONS: The cost-effectiveness of SC abatacept and adalimumab in adult RA patients with an inadequate response to MTX was comparable, based on measures of clinical efficacy and patient-reported outcomes.

SPONSORSHIP: This research was conducted by Bristol-Myers Squibb, Princeton, NJ, without external funding.

### Comparative Effectiveness of First-Line Subcutaneously Versus Intravenously Administered Biologics for Rheumatoid Arthritis Using a Validated Claims Data-Based Algorithm in a Large U.S. Commercial Health Plan

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BACKGROUND: There is an increasing interest in comparative effectiveness research, especially for high cost and increasingly utilized drugs such as biologic therapies for rheumatoid arthritis (RA). Although health insurance claims routinely contain information on medication use, outpatient encounters, hospital discharges and costs, and have been commonly used to evaluate safety questions, they do not typically include measures of medication effectiveness in RA that can serve to quantify clinical benefit. A claims-based algorithm to evaluate effectiveness of biologics for RA was developed and validated using administrative data from the Veterans Health Administration (VHA) linked to the VA RA registry (VARA). VARA includes key clinical measures of RA disease activity commonly used in clinical trials such as the Disease Activity Score in 28 Joints (DAS28). The DAS28 served as the gold standard to validate the effectiveness algorithm.

OBJECTIVE: To compare the effectiveness of commonly used subcutaneously (SC) (adalimumab, etanercept, golimumab) versus intravenously (IV) administered (abatacept and infliximab) biologics approved for first-line treatment of moderate to severe RA among patients in a large national U.S. health plan using the claims-based algorithm.

METHODS: This retrospective cohort study used commercial claims data from OptumInsight’s Life Science Research Database, which contains medical and pharmacy claims for more than 33.3 million individuals with both medical and pharmacy benefit coverage. Biologic naive adult patients with RA (714.0 cases) were included if they initiated treatment with either subcutaneously or intravenously administered biologics approved for RA prior to baseline (60.4% SC vs. 65.1% IV; P < 0.001). More IV patients used methotrexate prior to baseline (60.4% SC vs. 65.1% IV, P = 0.004) and concomitantly (56.8% SC vs. 62.9% IV, P < 0.001). Overall, the algorithm classified SC-administered agents effective in a higher percentage of patients than IV agents (30.6% vs. 22.1%, P < 0.001).

CONCLUSIONS: Using a new validated claims-based algorithm to compare the effectiveness of first-line biologics approved for RA, SC agents were rated as effective in a higher percentage of patients than IV agents using the algorithm. Future work assessing costs of these agents could be used in conjunction with these results to assess the cost-effectiveness of these agents.

SPONSORSHIP: This research was funded by Immunex Corporation, a wholly owned subsidiary of Amgen Inc., and by Wyeth, which was acquired by Pfizer Inc. in October 2009, Thousand Oaks, CA.
RESULTS: The study population included 69,927 patients prescribed an antipsychotic medication (female = 60.7%, mean age = 79.5 [± 6.8]). The majority of antipsychotic prescribing was for “off-label” conditions (95.0%). Of those treated with antipsychotics, 22.6% had a diagnosis of dementia (without bipolar or schizophrenia), 17.1% anxiety disorder, and 12.7% depression; 3.7% and 1.5% were for approved conditions bipolar disorder and schizophrenia, respectively. The top 5 medications were compared, including quetiapine, risperidone, haloperidol, olanzapine, and aripiprazole. Findings revealed significant differences in incidence of adverse outcomes for individual drugs; for example, incidence of death within 30 days of initiating treatment ranged from 9.4% of those prescribed haloperidol to 0.9% for aripiprazole.

CONCLUSIONS: “Off-label” use of antipsychotic medications in the elderly Medicare Advantage population remains high and results in significantly higher rates of adverse events. This study provides new information about the relative safety and incidence rates of most commonly used antipsychotics.

SPONSORSHIP: This research was conducted by Inovalon Inc., Bowie, MD, without external funding.

Comparing Health Care Resource Utilization and Costs in Medicaid Beneficiaries with Schizophrenia and Schizoaffective Disorders Before and After Initiation of Clozapine Monotherapy

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BACKGROUND: Treatment guidelines exist to guide the provision of quality care for patients with schizophrenia or schizoaffective disorders. Current guidelines support the utilization of clozapine monotherapy in patients with schizophrenia or schizoaffective disorders who have failed 2 prior antipsychotic treatments. The economic implications of the utilization of clozapine in Medicaid beneficiaries have not been widely discussed. Evidence of the trade-offs associated with clozapine use may be of interest to managed care pharmacists whose health plans increasingly serve Medicaid beneficiaries previously enrolled in Medicaid fee-for-services (FFS) plans.

OBJECTIVE: To compare health care costs and utilization in Medicaid patients with schizophrenia or schizoaffective disorders before and after initiation of clozapine monotherapy

METHODS: Data were from derived from the MarketScan Medicaid database. Inclusion criteria were (a) initiation of clozapine, with first such date identified as the index date; (b) receipt of at least 1 diagnosis of schizophrenia or schizoaffective disorder (ICD-9-CM of 295.xx) from 1 year prior to index date (pre-period) through 1 year post-index date (post-period); (c) continuous Medicaid enrollment between January 1, 2007, and January 1, 2009, for beneficiaries aged 18 through 64 years. Comparison of health care costs and utilization before and after initiation of clozapine therapy was assessed using paired t-tests and McNemar’s test for continuous and categorical variables, respectively. Each beneficiary served as their own case control. Pre/post outcomes of interest included changes in all-cause total direct medical payments as well as direct medical payments for treatment of all behavioral health therapy, expenditures for schizophrenia specific treatments, treatment for metabolic conditions such as myocardial infarction and diabetes, and those solely for the treatment of diabetic-related conditions. Health care resource utilization assessed variations in rates of inpatient admissions, emergency room (ER) utilization, and average length of inpatient stay.

RESULTS: 1,045 patients met the study inclusion/exclusion criteria for the pre/post assessment. The majority of the study cohort were white males with a mean [SD] age of 36.32 [12.5] years. Compared with the pre-period, direct medical payments for all-cause health care resource utilization decreased by 3.24% (P < 0.015) with reductions in inpatient expenditures offset by increases in outpatient payments. Direct medical payments for behavioral health treatments and schizophrenia specific treatments declined by 13.57% (P < 0.001) and 11.71% (P < 0.016), respectively. No statistically significant changes in direct medical payments for the treatment of metabolic disorders (P = 0.987) or diabetes (P = 0.912) were evident. No differences were observed in number of ER visits. Statistically significant reductions in all-cause hospitalizations (12.93%; P = 0.003), schizophrenia-related hospital stays (12.00%; < 0.001), and hospitalizations for diabetes-related issues (38.33%; P = 0.038) were revealed. In addition, the average length of stay for any type of hospitalization declined from as little as 29.33% (P = 0.016) to as much as 58.56% (P < 0.001).

CONCLUSIONS: Initiation of clozapine monotherapy reduces hospitalizations in Medicaid patients with schizophrenia or schizoaffective disorders.

SPONSORSHIP: This research was conducted by Teva Pharmaceuticals, USA, Kansas City, MO, without external funding.

Comparison of Health Care Resource Usage and Costs Before and After Initiating Treatment with Long-Acting Injectable Antipsychotics Among Medicaid Insured Schizophrenia Patients

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BACKGROUND: Some studies on patients with schizophrenia have shown that schizophrenia relapses, hospitalizations, and inpatient care costs decline after patients begin treatment with long-acting injectable (LAI) antipsychotics; however, these results have contrasted with other studies. There is a need for further studies examining outcomes of patients with schizophrenia after beginning treatment with LAI antipsychotics to gain a more comprehensive understanding of their impact on disease management. In the United States, Medicaid insures the great-est population of patients with severe mental illness, however, patients with schizophrenia insured by Medicaid are less well studied than those insured commercially or by Medicare.

OBJECTIVE: To compare health care resource usage and costs before and after initiating LAI antipsychotics among Medicaid-insured schizophrenia patients.

METHODS: Schizophrenia patients ≥13 years of age initiating LAI antipsychotics were identified from the Thomson Reuters MarketScan Research Medicaid database between July 1, 2005, and June 30, 2010. Patients were required to have 6 months of continuous medical/pre-scription drug coverage prior to (baseline) LAI initiation and during a variable follow-up period. Annualized health care resource usage and costs for the baseline and follow-up periods were determined and compared.

RESULTS: Among 5,694 eligible patients, 55% were male, and 45% were female with the majority of the population between the ages of 18 and 55 (86%). The study population had low general comorbidity as assessed by Charlson Comorbidity Index (CCI). In comparison to the baseline period, during the follow-up period (mean duration = 25.7 months) the mean number of hospitalizations per year, all cause (1.52±2.41 vs. 0.70±1.61; P < 0.001) and schizophrenia-related (1.21±2.04 vs. 0.57±1.41, P < 0.001) were reduced, as well as hospital lengths of stay (all cause: 14.77±28.61 vs. 5.75±16.26 days; P < 0.001; schizophrenia-related: 12.39±25.86 vs. 4.67±13.54 days; P < 0.001). As a result,
OBJECTIVE: To look at the proportion of nonmetastatic BC patients receiving T in an office clinic versus hospital outpatient setting and assess the impact of different sites of care on health care resource use (HRU) and costs.

METHODS: Adult women with BC (ICD-9-CM code 174.x) with 2 or more claims for a T infusion in a hospital outpatient or office clinic setting on or after 2008 were selected from the U.S.-based Humana database (2007-2012). Patients were required to be continuously eligible in their health care plans for ≥6 months prior to and ≥60 days following the first claims for a T infusion (index date). Patients with a diagnosis of secondary malignant neoplasm or who used T during the 6 months before the index date were excluded. T-treated patients were classified into 1 of the 2 cohorts: (1) hospital outpatient cohort, or (2) office clinic cohort. HRU and costs were measured over the period from the index date up to the end of continuous enrollment or up to 12 months after the index date, whichever occurred first. Differences in HRU were estimated using multivariate negative binomial regression models and reported as incidence rate ratios (IRRs). Monthly health care cost differences (2012 USD) were estimated using multivariate generalized linear 2-part models. T-related HRU and costs were defined as medical services/costs associated with a medical claim for T administration.

RESULTS: A total of 861 patients met the inclusion criteria; 67% received T in an office clinic and 33% in a hospital outpatient setting. Baseline patient characteristics were relatively well balanced, except in terms of index years and insurance plant type: a higher proportion of patients in the hospital outpatient cohort had Medicare coverage (68.4% vs. 55.9%; P<0.001). Age at index date was also slightly different (mean: 64.3 vs. 62.1; P=0.019). Compared with the office clinic cohort, patients in the hospital outpatient cohort had a greater average total monthly cost (adjusted difference: $1,599; P<0.001) primarily driven by higher hospital outpatient and office clinic costs in the hospital outpatient cohort ($1,196; P<0.001). Higher total costs were largely due to non–T-related costs (adjusted difference $1,283; P<0.001) primarily driven by higher hospital outpatient and office clinic costs in the hospital outpatient cohort ($1,196; P<0.001). Similar findings were observed in terms of HRU where patients in the hospital outpatient cohort had a greater incidence of non–T-related visits (IRR = 1.09; P=0.046) primarily driven by non–T-related hospital outpatient visits (IRR = 2.01; P<0.001).

CONCLUSIONS: About one-third of patients received T in a hospital outpatient setting, and the majority had Medicare coverage. Patients treated in a hospital outpatient setting had higher costs and HRU compared with patients in the office clinic cohort. Further research is warranted to explore the impact of these findings on treatment duration and quality of care.

SPONSORSHIP: This research was funded by Genentech Inc., South San Francisco, CA.
OBJECTIVE: To assess and compare adherence for angiotensin-convert-
ing enzyme inhibitors (ACEIs)/angiotensin receptor blockers (ARBs) using PDC and MPR and identify factors associated with adherence that should be considered for CMS case-mix adjustment.

METHODS: This was a retrospective claims database analysis that used pharmacy claims and enrollment data for Part D beneficiaries. PDC and MPR for ACEIs and ARBs were calculated based on specifications from CMS and the Utilization Review Accreditation Commission (v.1 for 2012 reporting). Descriptive analysis included reporting requirements and additional patient-level detail. Multivariate logistic regression analysis was used to identify factors associated with adherence. Case-mix-adjusted adherence was estimated using the predicted odds ratio (OR) for achieving PDC≥80% and impact on plan rating was estimated based on the proportion of patients predicted to be adherent.

RESULTS: 134,901 patients were included in the PDC analysis. Mean PDC was 88.8%. The MPR analysis included 62,017 and 25,169 patients for ACEIs and ARBs, respectively. Mean MPR was 92% for both ACEI and ARB populations. Positive influencers of adherence were the following: female gender (OR = 1.12; P < 0.0001), total baseline pharmacy cost $150-$999 (OR = 1.24; P < 0.0001) and ≥$1,000 (OR = 1.59; P < 0.0001) versus $0-$149, ≥1 claim for ACEI/ARB with days’ supply ≥90 (OR = 2.26; P < 0.0001), hypertension (OR = 2.52; P < 0.0001), and hyperlipidemia (OR = 1.09; P < 0.0001). Some negative influencers included diabetes (OR = 0.91; P < 0.0001), anxiety/tension (OR = 0.90; P = 0.0001), coronary/peripheral vascular disease (OR = 0.896; P < 0.0001), and depression (OR = 0.83; P < 0.0001). Using CMS’s threshold for a 5-star rating (≥77.9%), 55.2% of plans achieved a 5-star rating compared with PDC. Gender, higher burden of illness, select comorbidities, and 90-day fulfillment were found to influence ACEI/ARB adherence.

CONCLUSIONS: This study found higher adherence values for MPR compared with PDC. Gender, higher burden of illness, select comorbidities, and 90-day fulfillment were found to influence ACEI/ARB adherence. Quality-based performance measures, as well as coupled payment models, should consider case-mix adjustment. Further investigation among Part D populations with inherent differences (e.g., special needs with disproportionate comorbidity mix) is warranted.

SPONSORSHIP: This research was funded by Takeda Pharmaceuticals U.S.A., Inc., Deerfield, IL.

Cost Analysis of Certolizumab Pegol and Infliximab Therapy at 1 and 2 Years in Patients with Crohn’s Disease

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BACKGROUND: Crohn’s disease is a chronic inflammatory disease of the gastrointestinal tract for which there is currently no cure. Long-term complications of uncontrolled disease include stricture, fistulizing disease, and surgery. Anti-tumor necrosis factor-a (TNF) therapy is increasingly being used in patients with Crohn’s disease who have an inadequate response to conventional therapy. Treatment goals are to modify the disease course and prevent long-term complications. There are currently 3 anti-TNF agents approved for the treatment of moderate to severe Crohn’s disease in the United States. Of these, only certolizumab pegol (administered subcutaneously) and infliximab (administered intravenously) can be billed against a patient’s medical insurance benefit.

OBJECTIVE: To evaluate treatment costs at 1 and 2 years in patients with Crohn’s disease who are prescribed an anti-TNF agent administered subcutaneously (certolizumab pegol: prefilled syringe or lyophilized [PFS/LYO]) or intravenously (infliximab).

METHODS: OptumInsight’s Clinformatics Data Mart, a database of administrative health claims from a large national health insurer, was used for analysis. U.S. patients who had a diagnosis of Crohn’s disease and were identified and received a prescription for an anti-TNF from April 2008-January 2012. Patients were eligible for inclusion in the analysis if they were aged 18 years or older, had not received anti-TNF therapy in the 6 months prior to first anti-TNF, and had 24 months pharmacy and medical continuous enrollment in the database. Costs were presented in 2 ways: medication acquisition costs (direct cost of biologic only) and Crohn’s disease-related costs (includes all Crohn’s disease-related medications and administration, visits, and procedures). This study reports costs for patients still receiving the initial anti-TNF therapy at 1 year and at 2 years.

RESULTS: Over 1 and 2 years, the average biologic and Crohn’s disease-related costs (including biologic costs) were lower among patients treated with certolizumab pegol than patients treated with infliximab (table). This analysis of a U.S. claims database showed that over 1 and 2 years patients prescribed a subcutaneous anti-TNF (certolizumab pegol) had lower claims costs than patients prescribed an intravenous anti-TNF (infliximab). Limitations of this type of database analysis may include the inability to account for disease severity and patient demographics and the fact that the number of patients with available claims based on utilization patterns at 1 and 2 years was low.

SPONSORSHIP: This research was conducted by UCB Pharma, Smyrna, GA; Truven Health Analytics, Inc., Atlanta, GA (formerly the Healthcare Business of Thomson Reuters), and OptumInsight/UHC, Duluth, GA, without external funding.

Cost-Effectiveness of Fingolimod Versus Teriflunomide for the Treatment of Patients with Relapsing-Remitting Multiple Sclerosis (RRMS)

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BACKGROUND: Multiple sclerosis (MS) is a chronic condition often associated with high economic burden. Previously published economic analyses have shown the relative economic efficiency of existing self-injected disease-modifying therapies (DMTs). However, the recent approval of oral DMTs warrants an evaluation of these newer agents for the treatment of MS.

OBJECTIVE: To estimate the cost per relapse avoided of fingolimod versus teriflunomide from a U.S. commercial payer perspective.

<table>
<thead>
<tr>
<th>TABLE</th>
<th>Average Costs for Anti-TNF Treatment in Patients with Crohn’s Disease</th>
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<tbody>
<tr>
<td></td>
<td>Over 1 Year</td>
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<tr>
<td></td>
<td>Certolizumab pegol</td>
</tr>
<tr>
<td>Average cost per patient (US $)</td>
<td>75</td>
</tr>
<tr>
<td>Biologic acquisition</td>
<td>22,227</td>
</tr>
<tr>
<td>All Crohn's disease-related costs</td>
<td>28,104</td>
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TNF=tumor necrosis factor.
METHODS: This Microsoft Excel-based model estimated the cost-effectiveness of fingolimod compared with teriflunomide, the only 2 FDA-approved oral treatments for relapse-remitting multiple sclerosis (RRMS). The analysis calculated the cost per relapse avoided for each of the products over 2 years (including drug acquisition costs using wholesale acquisition cost [WAC], direct costs of managing relapses, and monitoring costs) divided by the number of relapses avoided. Cost data were derived from published sources. The relative risk reductions (RRR) for each DMT were obtained from the respective placebo-controlled phase 3 clinical trials (FREEDOMS and TEMSO), and the average number of relapses over 2 years for an untreated patient was obtained from published estimates. Univariate sensitivity analysis was performed to test the robustness of the model.

RESULTS: Fingolimod was the more cost-effective DMT, with a 2-year cost per relapse avoided of $92,630 in comparison with $125,564 for teriflunomide. Univariate sensitivity analysis of the cost per relapse avoided for fingolimod showed the results were most sensitive to the drug acquisition cost of fingolimod and the average number of relapses in untreated patients; however, the rank-order of the results remained unaffected. In a scenario where drug acquisition costs were varied at different ranges, the WAC of fingolimod had to be increased by 40% for the cost per relapse avoided of fingolimod to be higher than teriflunomide.

CONCLUSIONS: Fingolimod has a lower cost per relapse avoided compared with teriflunomide. This cost-effectiveness was driven by its high efficacy in reducing the frequency of relapses in MS patients.

SPONSORSHIP: This research was conducted by Novartis Pharmaceuticals Corporation, East Hanover, NJ, without external funding.

Costs and Discontinuation Rates Among Protease Inhibitor-Treated Hepatitis C Virus Patients in a Regional Health Plan

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BACKGROUND: Two triple therapy (protease inhibitor, pegylated interferon alfa, and ribavirin) options have emerged for patients with hepatitis C virus (HCV) genotype 1 infection. Both options have been tested in clinical trials and are supported for use by the major HCV treatment guiding organization. Due to the complicated regimens, potential side effects, and costs of treatment, discontinuation rates are a concern for payers, providers, and patients.

OBJECTIVE: To identify discontinuation rates, costs of treatment, and costs of discontinuation and adherence rates for HCV-treated patients among a regional health plan.

METHODS: Using a large health plan pharmacy database (approximately 1.2 million lives), all continuously enrolled health plan patients initiated on telaprevir or boceprevir were identified between May 1, 2011, and July 31, 2012. Based on telaprevir and boceprevir minimum initiation and futility treatment algorithms, claims-based assumptions were developed to identify patients as discontinuing, completing, or actively on therapy. Baseline characteristics, course of treatment, discontinuation rates of therapy, and costs of therapy associated with completing and discontinuing therapy were analyzed using descriptive statistics with each respective treatment.

RESULTS: A total of 326 protease inhibitor (PI)-treated patients were identified for this analysis; mean age 53.0; average length of PI therapy 11.3 weeks. Of the 326 patients, 270 patients (82.8%) were treated with telaprevir with the following breakdown (n [%]): active therapy (26, 9.6%), discontinued therapy (88, 32.6%), and completed therapy (156, 57.8%). The mean treatment costs (PI + pegylated interferon) associated with completion and discontinuation of telaprevir therapy were $69,625.95 and $29,377.17, respectively. 56 patients (17.2%) were treated with boceprevir in this health plan with the following breakdown (n [%]): active therapy (12, 21.4%), discontinued therapy (11, 19.6%), and completed therapy (33, 58.9%). The mean treatment costs (PI + pegylated interferon) associated with completion and discontinuation of boceprevir therapy are $48,086.64 and $13,877.73, respectively. Adherence rates for telaprevir and boceprevir were 92.3% and 88.0%, respectively.

CONCLUSIONS: Among this regional health plan, adherence to therapy was similar between both HCV treatment regimens. Discontinuation rates for both PIs were high in this claims-based analysis. Costs of discontinuation and completion of therapy were significantly higher in telaprevir-treated patients. Due to the similar adherence rates seen, health plans should incorporate the costs of discontinuation and completion of therapy when developing decision-making models for utilization management in HCV treatment.

SPONSORSHIP: This research was conducted by CDMI, LLC, Newport, RI, without external funding.

Diminishing Rate of Return? Health Outcomes Associated with Initiation of Basal Insulin After 1, 2, or 3+ Oral Antidiabetic Drugs Among Managed Care Patients with Type 2 Diabetes

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BACKGROUND: Timely initiation of insulin may help patients with type 2 diabetes mellitus (T2DM) not maintaining adequate glycemic control using oral antidiabetic drugs (OADs). However, real-world health outcomes data are limited.

OBJECTIVE: To descriptively assess real-world health outcomes associated with basal insulin initiation among T2DM patients previously treated with 1, 2, or 3+ OADs in a managed care setting.

METHODS: Using data from a national managed care claim database (IMPACT), this observational study included adult T2DM patients who initiated a basal insulin between January 1, 2001, and December 31, 2011, had a continuous health plan enrollment for 6 months before (baseline) and 12 months after insulin initiation (follow-up), and had 1 or more OAD prescription, but no use of pramlintide, GLP-1 receptor agonist, or insulin during baseline. Patients were stratified by the number of OADs used during baseline (1, 2, or 3+ OAD). One-year follow-up outcome measures were treatment persistence, hemoglobin A1c levels among those with data available, hypoglycemia rate, health care utilization, and costs.

RESULTS: A total of 62,644 patients were included (1 OAD: 16,481 [26.3%]; 2 OAD: 25,336 [40.4%]; 3+ OAD: 20,827 [33.2%]). Significant baseline differences existed between the 3 groups. Overall, when compared with 2 or 3+ OAD patients, 1 OAD patients were sicker (Charlson Comorbidity Index 1.02 vs. 0.81 vs. 0.62), had higher rates of macrovascular diseases (congestive heart failure, 12.0% vs. 9.7% vs. 7.2%; peripheral vascular disease, 6.8% vs. 6.3% vs. 5.3%; and cerebrovascular disease, 7.2% vs. 6.6% vs. 5.0%), yet lower rates of neuropathy (10.2% vs. 11.3% vs. 11.2%) and retinopathy (8.2% vs. 9.8% vs. 11.9%), higher rates of hospitalizations (28.2% vs. 21.7% vs. 15.4%), emergency room (ER) visits (32.8% vs. 27.5% vs. 21.3%), hypoglycemia (5.4% vs. 4.7% vs. 3.9%), and higher health care costs ($16,408 vs. $13,132 vs. $10,774, figure). Baseline A1c levels were similar across the 3 groups (9.21% vs. 9.23% vs. 9.15%). At the end of the 1-year follow-up, despite the
lowest treatment persistence rate in the 1 OAD group (67.1% vs. 76.1% vs. 82.0%; 1 OAD vs. 2 OAD, \( P < 0.0001 \); 1 OAD vs. 3+ OAD, \( P < 0.0001 \)), this group had the highest A1c reduction when compared with 2 OAD and 3+ OAD patients (-1.33 vs. -1.07 vs. -0.89%; 1 OAD vs. 2 OAD, \( P = 0.0004 \); 1 OAD vs. 3+ OAD, -1.33, \( P < 0.0001 \)). Patients who persisted with treatment had greater A1c reduction in the 1 OAD (-1.49 vs. -1.14%, \( P = 0.01 \)) and 2 OAD groups (-1.15 vs. -0.92%, \( P = 0.008 \)), but not in the 3+ OAD group (-0.90 vs. -0.83%, \( P = 0.451 \)). Hypoglycemia and hospital/ER hypoglycemia rates were 4.2% and 0.5% for 1 OAD, 4.2% and 0.5% for 2 OAD, and 3.6% and 0.2% for 3+ OAD patients. In all 3 groups, the total health care costs decreased compared with the baseline, particularly in the 1 OAD group, mainly due to decreased inpatient costs, which offset the increase in drug costs (figure).

CONCLUSIONS: In this descriptive, observational study, patients with T2DM who were previously treated with 1, 2, or 3+ OADs and initiated insulin therapy were significantly different at baseline and had high A1c levels. Although significant improvements in clinical and economic outcomes were observed in all 3 groups, the highest improvement was observed among patients previously treated with 1 OAD. This data supports the call for timely initiation of insulin therapy for T2DM patients not maintaining glycemic control with OAD.

SPONSORSHIP: This research was funded by sanofi-aventis U.S., Bridgewater, NJ.

Disease-Modifying Therapy in Patients with Multiple Sclerosis: Treatment Patterns over 2 Years
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BACKGROUND: Patients with multiple sclerosis (MS) whose disease activity is inadequately controlled with a platform therapy (interferon beta or glatiramer acetate [GA]) may switch to another platform therapy or escalate therapy to natalizumab or fingolimod, which were approved in the United States in 2006 and 2010, respectively.

OBJECTIVE: To describe treatment patterns and characteristics of patients who initiated disease-modifying therapy (DMT) for MS and were followed for 2 years.

METHODS: Data were derived from the MarketScan Commercial and Medicare Supplemental databases, which are retrospective claims databases representative of the U.S. managed care population. The study population included adult MS patients who initiated treatment with an interferon beta, GA, or natalizumab on or after January 1, 2007, had at least 30 months of continuous data (6 months before and 24 months after the treatment initiation [index date]), and had not used any MS therapy 6 months prior to the index date (baseline). Baseline demographics, concomitant medications, and comorbid conditions were analyzed in relation to treatment switching and discontinuation patterns.

RESULTS: Data from 6,181 MS patients initiating therapy with a single DMT (index therapy) were evaluated (76.7% female; mean age 44.6 years). The majority of patients (75.9%) had seen a neurologist between their MS diagnosis and the index date. Chronic pain and high blood pressure were among the most common comorbid conditions. Patient characteristics were similar regardless of index therapy. A total of 5,735 patients (92.8%) initiated treatment with a platform therapy, and 446 patients (7.2%) initiated treatment with natalizumab. During the 2-year follow-up, 72.2% of patients on platform therapy and 77.1% of those on natalizumab remained on their index therapies; discontinuation rates were 8.7% and 9.0%, respectively. Compared with patients who remained on index therapy, those who discontinued were significantly older, whether they started on platform therapies (mean age 45.0 vs. 46.4 years \( P = 0.015 \)) or on natalizumab (mean age 45.0 vs. 49.3 years \( P = 0.015 \)). Patients who discontinued platform therapy were less likely to have seen a neurologist (70.4% vs. 76.2%; \( P = 0.005 \)) and had significantly higher baseline rates of antidepressant and muscle relaxant use compared with patients who remained on index platform therapy. Of 5,735 patients starting on a platform therapy, 1,095 (19.1%) switched therapies after a mean (SD) of 330.7 (203.8) days. Among these patients, 861 (78.6%) switched to another platform therapy, while 209 (19.1%) and 25 (2.3%) switched to natalizumab and fingolimod, respectively.
Patients who switched from a platform therapy to natalizumab had more baseline intravenous corticosteroid use than patients who switched between platform therapies (31.6% vs. 20.3%; P<0.001). Of the 446 patients starting on natalizumab, 62 (13.9%) switched therapies after a mean (SD) of 400.9 (197.5) days; 61 patients switched to a platform therapy, and 1 patient switched to fingolimod.

CONCLUSIONS: Most patients remained on their initial DMTs during the first 2 years of treatment. Of the patients who switched, the majority switched to other platform therapies, even though they may benefit from treatment escalation.

SPONSORSHIP: This research was funded by Biogen Idec Inc., Cambridge, MA.

Early Adherence with Disease-Modifying Drugs Predicts Future Adherence in Patients with Multiple Sclerosis

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BACKGROUND: In multiple sclerosis (MS), nonadherence to disease-modifying drugs (DMDs) has been associated with the likelihood of experiencing severe relapses. Predictive models that rely on administrative claims data to predict adherence with DMDs have often focused on demographic characteristics, comorbidities, or previous consumption of health care resources. To our knowledge, no one has investigated how early adherence with DMDs is able to predict future adherence outcomes in patients with MS.

OBJECTIVE: To evaluate early DMD adherence as a predictor of future adherence with DMDs in patients with MS.

METHODS: Adult MS patients (≥18 and ≤65 years) who received outpatient self-injected DMDs between January 1, 2006, and May 31, 2010, were identified using claims data from a national U.S. managed care database. The date of the first DMD claim was the analysis index date. Patients were required to have continuous prescription coverage for 12 months before and 24 months after the index date. Multivariate regression was used to predict future adherence using the proportion of days covered (PDC). The base model included age, gender; sum of day’s supply for all medications from 180 days pre-index (i.e., a medication intensity measure); an indicator for having a non-MS-related hospitalization within 360 days pre-index, and markers for comorbidities that indicated physical difficulty, forgetfulness, or depression/stress. Models for early DMD adherence were analyzed using incrementing 30-day periods predicting the subsequent 360 days.

RESULTS: There were 4,606 patients who met the study criteria. The average age was 46.0 (SD 9.4) years, and 78.7% were female. Average PDC in the first 360 days post-index was 80.0% (SD 26.0). A total of 8.8% had at least one hospitalization, and depression/stress (22.8%) and physical difficulty diagnoses (31.1%) were common. Using only the first 60 days of early adherence with no additional variables showed an r-squared of 20.6%. Using only the pre-period and demographic variables to predict adherence during the year post-index yielded an adjusted r-squared of 2.3%. Adding 60 days of early adherence data increased the r-squared to 22.4%. As the time period of early adherence was increased, the explained variance as measured by adjusted r-squared values increased from 21.6% to 53.5% when an entire year of DMD adherence was used. Addition of the covariates to the model increased the r-squared by 1% to 2%.

CONCLUSIONS: Predictive models that rely only on early adherence with DMDs were able to explain the variance in future adherence outcomes to a greater extent than models based solely on baseline characteristics. Early DMD adherence offers a new and simpler modeling approach to predict future adherence in patients with MS.

SPONSORSHIP: This research was conducted by EMD Serono, Inc., Rockland, MA, and Pfizer Inc., New York, NY, without external funding.

Economic Burden of Irritable Bowel Syndrome with Constipation: A Retrospective Analysis of All-Cause Health Care Costs

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BACKGROUND: The prevalence of irritable bowel syndrome with constipation (IBS-C) is estimated to be between 1.3% and 5.7% in the United States. However, little is known about the total health care costs associated with IBS-C.

OBJECTIVE: To evaluate total annual all-cause health care costs of IBS-C in different health plan benefit designs and assess the incremental costs associated with IBS-C in a commercially insured population.

METHODS: Patients aged ≥18 years continuously enrolled in 2010 were identified using claims from the HealthCore Integrated Research Database, which consists of 14 geographically dispersed U.S. health...
plans representing 45 million members. IBS-C patients were defined as having ≥1 medical claim with an ICD-9-CM code for IBS (564.1x) and ≥2 medical claims with an ICD-9-CM code for constipation (564.0x) or ≥1 medical claim for constipation plus ≥1 pharmacy claim for a constipation-related prescription. Controls without IBS, constipation, abdominal pain, or bloating were randomly selected using 1:1 matching on age, gender, health plan region, and type of health plan benefit design. Patients with potentially confounding conditions (e.g., chronic diarrhea or drug-induced constipation) were excluded. Patients were categorized by health plan benefit design into noncapitated health maintenance organizations (HMO), preferred provider organizations (PPO), Medicare Advantage, and other benefit designs. Total all-cause health care costs consisted of pharmacy costs and costs of medical services, including inpatient visits, emergency room visits, physician office visits, and other outpatient services. Generalized linear models with bootstrapping were used to assess the incremental costs attributable to IBS-C adjusted for demographics and general gastrointestinal-related comorbidities.

RESULTS: Of 7,652 IBS-C patients and controls identified, 74.3% had a PPO design, 14.3% had a noncapitated HMO benefit design, 4.4% had Medicare Advantage, and 6.8% had a variety of other health plan benefit designs. Overall, the mean age (±SD) was 48 (±17) years, and 83.6% were female. IBS-C patients had consistently higher unadjusted total annual all-cause health care costs versus matched controls in the overall study population and among each of the health plan benefit designs (see figure). Higher unadjusted all-cause costs were primarily driven by medical costs regardless of health plan benefit design (81%-84% of total costs; figure). This finding remained consistent in the overall study population even after adjusting for demographic characteristics and comorbidities, with total incremental all-cause costs associated with IBS-C of $3,856 (P < 0.001), and 79.2% of this difference driven by medical costs.

CONCLUSIONS: These findings highlight the significant economic burden of IBS-C in a commercially insured population, with a consistent burden observed across different types of health plan benefit designs. Medical services were the primary driver of incremental all-cause costs regardless of health plan benefit design.

SPONSORSHIP: This research was conducted by Forest Laboratories, Inc., Jersey City, NJ, and Ironwood Pharmaceuticals, Inc., Cambridge, MA.

Economic Burden of Pain in a National Health Insurance Plan

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BACKGROUND: Pain is multifunctional; thus, it can be challenging to treat. The cost implications of pain-related health care resource utilization (HCRU) are substantial. Understanding the economic burden of pain HCRU will enable providers and payers to allocate resources more efficiently for improved management of different pain conditions.

OBJECTIVE: To track the annual HCRU (inpatient, outpatient, emergency room visits, and pain-related medications) associated with 36 chronic and 14 acute pain conditions and calculate the corresponding costs per member. These estimates were used to rank the economic burden of each condition in terms of expense to the plan.

METHODS: This retrospective study utilized enrollment, medical, and pharmacy claims data from Humana's fully insured commercial and Medicare membership. Study subjects were identified with a pain condition specified by an ICD-9-CM diagnosis in the primary diagnosis position on the medical claim during the index period (July 1, 2008–September 30, 2011). A second diagnosis ≥90 days from the first was required for chronic conditions, and no diagnosis of the index condition prior to the index date was required for acute conditions. HCRU and costs were tracked over a 365-day period subsequent to the index date. Additionally, all pain-related prescription medications were measured. HCRU and costs for the pain conditions were estimated per member and informed unadjusted estimates of annual costs from the plan's perspective for each specific pain condition. Conditions were ranked based on log-linear adjusted cost models. All analyses were stratified by membership in commercial or Medicare plans.

RESULTS: The impact of specific pain conditions varied by plan type. For commercial plans, 267,948 members were identified with a chronic or acute pain condition. The most expensive conditions were back pain (adjusted annual plan-wide costs were $119 million), osteoarthritis ($98 million), childbirth ($69 million), injuries ($81 million), and nonhip/nonspine fractures ($48 million). The most expensive pain-related conditions per commercial member were burns reclassified as chronic (adjusted cost per member $140,524), spinal cord injuries ($77,093), and repeated spine fractures ($25,931). For Medicare plans, 596,616 members were identified with a chronic or acute pain condition. The most expensive conditions to the plan were osteoarthritis ($327 million), back pain ($218 million), hip fractures ($117 million), injuries ($82 million), and nonhip/nonspine fractures ($67 million). The most expensive pain-related conditions per Medicare member were burns ($27,234), repeated hip fractures ($21,058), and acute hip fractures ($12,336).

CONCLUSIONS: Total pain-related expenses to the plan were higher for the Medicare population. Several of the most expensive pain conditions per member do not have a significant impact on total plan-wide costs, as overall prevalence is low. The economic burden of back pain and osteoarthritis was substantial in both plan populations, and hip fractures was substantial in the Medicare population. Further examination specific to how pain is managed in these high cost conditions will enable providers and payers to develop strategies to improve patient outcomes through appropriate pain management.

SPONSORSHIP: This research was funded by Humana Inc., Louisville, KY, and Pfizer Inc., New York, NY.

Establishment and Evaluation of a Pharmacist-Run Lipid Clinic Within a Managed Care Organization

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BACKGROUND: Heart disease is one of the leading causes of death and disability in the United States, resulting in approximately 700,000 deaths per year. One of the most prevalent risk factors for heart disease-related deaths is dyslipidemia. This study attempts to analyze the impact of adding pharmacist care for lipid management in diabetes mellitus patients by creating a telephone-based lipid clinic within a managed care organization.

OBJECTIVE: To integrate with the organization's existing diabetic case management team to assist with reducing patients' low-density lipoprotein (LDL).

METHODS: A retrospective chart review was conducted on all patients enrolled in the pharmacist-run clinic who had appropriate follow-up laboratory data. Baseline LDL values were recorded and compared with values obtained at follow-up using a paired t-test. Pharmacist interventions, patient adherence, and the incidence of adverse drug reactions prior to and during clinic enrollment were also recorded.

RESULTS: Patients that were enrolled in the pharmacist-managed lipid clinic had a mean reduction in LDL of 17 mg/dL (P<0.0001). Data
Evaluation of a Claims-Based Algorithm to Determine the Effectiveness of Biologics for Rheumatoid Arthritis Using Commercial Claims Data

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BACKGROUND: As more biologics are approved for moderate to severe rheumatoid arthritis (RA), there is an increasing interest in comparative effectiveness between agents. Health insurance claims have data from large numbers of patients and are commonly used to evaluate safety questions but do not typically contain information on commonly used clinical measures to quantify effectiveness (i.e., improvement in arthritis symptoms). A recently published algorithm was developed using Veterans Health Administration claims data and validated against the DAS28ESR data from the national VA RA registry to enable evaluation of the effectiveness of biologics for RA using only claims data.

OBJECTIVE: To confirm the utility of this claims-based effectiveness algorithm using a commercial claims data source.

METHODS: Data came from a previous comparative-effectiveness study using outpatient medical records from multiple U.S. institutions and private physician practices, linked to commercial claims data from OptumInsight, to evaluate the effectiveness of etanercept (ETN), adalimumab (ADA), and infliximab (INF) in commercially insured, biologic-naive (no biologic use in the prior 6 months) adult RA patients persistent on their initial biologic for ≥1 year from 2006-2008. Two teams of 2 rheumatologists reviewed each medical record and categorized clinical response at approximately 1 year as follows: much better, better, no change, worse, or much worse. For this study, the biologic was considered not effective if the patient was rated as “no change,” “worse,” or “much worse.” Sensitivity, specificity, and negative predictive value could not be determined because patients who switched biologic agents or had low adherence were excluded from the original study sample. The biologic was considered not effective by the claims-based algorithm if any of the 6 previously published criteria was met: adherence to medication (medication possession ratio [MPR] <80% or receiving less than the expected number of infusions), increase in biologic dose or frequency, switching biologics, addition of new nonbiologic disease-modifying antirheumatic drugs, increase in glucocorticoid dose, and >1 parenteral or intra-articular injection. The positive predictive value (PPV) was calculated comparing the classification assigned by the algorithm to the rheumatologist rating from the previous study as the clinical gold standard. Different compliance thresholds (e.g., MPR ≥75% vs. ≥80%) and lowering the required number of infusions for INF to expected -1 were evaluated as sensitivity analyses.

RESULTS: A total of 429 patients were available for study. The majority (76%) were female, mean age of 51 years. Overall, PPV of the effectiveness algorithm was similar in the main analysis (86.6%) and in the sensitivity analysis (86.5%). The PPV did not differ by biologic (P >0.2): INF (95%), ETN (86%), and ADA (85%). The PPV of each component of the algorithm was lower than that of the complete algorithm.

CONCLUSIONS: A previously published and validated claims-based algorithm to assess effectiveness of biologics for RA had high PPV in an independent dataset of commercially insured patients. This algorithm may be useful to compare the effectiveness of biologic agents for RA using health plan or claims data in future studies.

SPONSORSHIP: This research was funded by Immunex Corporation, a wholly owned subsidiary of Amgen Inc., and by Wyeth, which was acquired by Pfizer Inc. in October 2009, Thousand Oaks, CA.

Evaluation of a Member-Directed Part D Medication Adherence Intervention

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BACKGROUND: The Centers for Medicare and Medicaid Services (CMS) Part D Star Ratings Program measures quality of care allowing beneficiaries to compare available prescription drug plans. Health plans have begun to apply existing care management infrastructure as an approach to improving member medication adherence. MedImpact Healthcare Systems, Inc., a pharmacy benefits manager; iCare, a Medicare Advantage Prescription Drug plan with a dual-eligible special needs population; and US MED, a mail order pharmacy, designed a member-directed program aimed to increase medication adherence to the 3 adherence Patient Safety Measures: oral diabetes (D16), hypertension (RAS antagonists/D17), and cholesterol (statins/D18).

OBJECTIVE: To implement and assess effectiveness of a coordinated medication adherence intervention.

METHODS: Monthly analysis of pharmacy claims identified beneficiaries that were nonadherent as calculated by the proportion of days covered (PDC<80%). Risk factors were additionally assessed based on beneficiaries with multiple adherence issues, newly started versus continuation users to therapy, and most recent 6-month adherence level. Data files listing beneficiary adherence information were formatted, sent to US MED and loaded into iCare’s care management system where care coordinators counseled beneficiaries on the importance of adherence and options for medication home delivery. Beneficiary and overall health plan adherence rates were estimated for program enrollees, intervention group, and those not enrolled, nonintervention group, and adjusted by beneficiary enrollment length using CMS technical specifications. Regression analysis was conducted to assess significant changes in adherence rates pre- and post-implementation by intervention group.

RESULTS: Since the May 2012 implementation, 1,500 nonadherent beneficiaries were referred to both care coordinators and customer service specialist teams at US MED, 571 (38.1%) of which enrolled in the US MED program. 52.5% of beneficiaries were nonadherent to at least one of the 3 adherence measures. Change in adherence rates for program enrollees was significantly greater than nonenrollees for each of the 3 measures: oral diabetes (β=7.67, P<0.001), hypertension (β=8.33, P<0.001), and cholesterol (β=13.5, P<0.001). The overall health plan adherence rates analyzed using pre- (January to July 2011) to post-implementation (January to July 2012) review periods increased by absolute differences of 13.5%, 11.6%, and 8.5% for oral diabetes, hypertension, and cholesterol, respectively.
CONCLUSIONS: Beneficiaries in this Medicare-eligible population benefited from multiple points of contact to achieve increased adherence. A health plan’s pharmacy and care management team can effectively utilize pharmacy and benefit management partners to offer novel methods to improve beneficiary and overall health plan medication adherence.

SPONSORSHIP: This research was conducted by MedImpact Healthcare Systems, Inc., San Diego, CA, without external funding.

Evaluation of an Interactive Voice Response Program to Influence Patient Behavior with Antihypertensives Use

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BACKGROUND: A brand-to-generic program for angiotensin receptor blockers (ARBs) using interactive voice response (IVR) technology as the communication channel was administered. The goal of the program was to increase member engagement while promoting cost-saving opportunities. Members filling a nonpreferred ARB (target drug) were identified on a weekly basis for IVR communication to switch to a preferred drug.

OBJECTIVE: To compare cost for ARB treatment for individuals who switched to preferred agent versus nonswitchers and describe the persistence of the preferred medication after a successful switch at 6 months post-intervention.

METHODS: A commercial health plan’s members with at least 1 fill of a nonpreferred ARB from August 1, 2011, through October 31, 2011, were targeted. Members were identified once, but a member could receive up to 2 outbound call attempts. Successful conversion from target to preferred ARB, time to switch, days supply for target and preferred ARB fills, and costs for ARB treatment were assessed in the 6-month post-intervention period. The intervention date was defined as the date the IVR call was authenticated. Cumulative days supply for the target and preferred ARBs were used as proxies for persistence.

RESULTS: 1,054 members were authenticated through IVR, and 14.5% (n = 153) successfully switched to a preferred ARB. Among switchers, median time to switch was 59.0 days [SD = 69.6]. On average, switchers had 2.8 claims [SD = 2.2] for the target drug before switching and 3.4 claims [SD = 2.3] for the preferred drug during the 6-month period. For switchers, median copay for the target drug was $35.00 [SD = 29.96] versus $6.75 [SD = 5.81] for preferred drug; median plan paid amount for the target drug was $57.45 [SD = 33.62] versus $0 [SD = 2.99] for preferred ARB. Among nonswitchers (n = 901), median copay for target drug claim was $33.00 [SD = 29.01], and median plan paid amount per target drug claim was $63.68 [SD = 40.87]. On average, nonswitchers had 6.2 claims [SD = 3.1]. Cumulative 6-month ARB cost for both switchers and nonswitchers was $683,213, with plan paid amount of $421,247. For switchers, plan paid amount for ARBs was $28,006 versus $393,241 for nonswitchers (n = 901). Switchers’ average cumulative days supplied was 198.0 days [SD = 76.9] for nonswitchers. Switchers’ average cumulative days supplied was 198.0 days [SD = 76.9] for nonswitchers. Switchers’ average cumulative days supplied was 198.0 days [SD = 76.9] for nonswitchers. Switchers’ average cumulative days supplied was 198.0 days [SD = 76.9] for nonswitchers.

CONCLUSIONS: The study found that using IVR technology to encourage member behavior change was effective in promoting the use of preferred ARBs and reducing drug costs for patients and payer, while achieving better persistence on ARB therapy.

SPONSORSHIP: This research was conducted by MedImpact Healthcare Systems, Inc., San Diego, CA, without external funding.

Evaluation of Increased Adherence and Cost Savings of an Employer Value-Based Benefits Program Targeting Generic Antihyperlipidemic and Antidiabetic Medications

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BACKGROUND: A major employer implemented a change to its employee health benefits program to allow beneficiaries with diabetes or high cholesterol to obtain specified generic antidiabetic or antihyperlipidemic medications at zero dollar copayment. To receive this benefit, plan beneficiaries were required to participate in a contracted vendor’s case management and/or wellness program.

OBJECTIVE: To assess changes in medication adherence and expenditures for generic antidiabetic and antihyperlipidemic medications resulting from participation in a zero copay program.

METHODS: This was a retrospective pre/post comparison group study. The employer’s de-identified prescription drug records were examined for this study from January 2009 through December 2011. Eligibility for program participation required participation in the vendor’s case management or wellness program. Zero copay program participants and nonparticipants were matched on age, gender, comorbidity count, and baseline fill count via 1:1 propensity scoring, resulting in 218 antidiabetic only (AD) matched pairs, 798 antihyperlipidemic only (AH) matched pairs, 599 antidiabetic matched pairs who were users of both antidiabetic and antihyperlipidemic medications (ADAH), and 601 antihyperlipidemic matched pairs who were users of both medications. The proportion of days covered (PDC) metric was used to assess adherence to medication therapy.

RESULTS: In the AD, AH, and ADAH subgroups, zero copay users exhibited statistically higher absolute mean changes in PDC from the pre-period to the post-period when compared with the comparison group (15.5%, P < 0.001; 17.5%, P < 0.001; 3.9%, P = 0.005; and 6.7%, P < 0.001, respectively. This represented, on average, 40 additional days of medication possession by the zero copay users. The nonzero copay and zero copay groups exhibited different drug switching patterns from the pre- to post-period. Fewer nonzero copay patients switched from brand to generic drugs compared with zero copay patients. In the nonzero copay group, despite a decline of 3.4% in utilization, average cost per utilizing member per year decreased by $18 (3.1%) in the zero copay group because of the shift from brand name to generic drugs compared with zero copay patients. In the zero copay group, despite a decline of 3.4% in utilization, average cost per utilizing member per year decreased by $18 (3.1%) in the zero copay group because of the shift from brand name to generic drugs compared with zero copay patients. The zero copay group, despite a decline of 3.4% in utilization, average cost per utilizing member per year decreased by $18 (3.1%) in the zero copay group because of the shift from brand name to generic drugs compared with zero copay patients. The zero copay group, despite a decline of 3.4% in utilization, average cost per utilizing member per year decreased by $18 (3.1%) in the zero copay group because of the shift from brand name to generic drugs compared with zero copay patients.

CONCLUSIONS: Plan sponsors are increasingly evaluating the use of Value-Based Benefit Design to change member behavior. This program used a reduction in cost-sharing to incent members to use more generic drugs and to enroll in a care management coaching program. When considering the introduction of such a design, plan sponsors are often concerned that the reduction in cost-sharing may increase the sponsor’s cost without inducing changes in behavior of the noncompliant members. Our study indicated that a plan sponsor can achieve the desired goals (increased drug adherence and generic drug penetration) without increasing the plan sponsor’s cost.

SPONSORSHIP: This research was conducted by Walgreen Co., Deerfield, IL, without external funding.
Evaluation of Natalizumab (Tysabri) Utilization and Costs for Utilization Management Opportunities

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BACKGROUND: Natalizumab (Tysabri) is a humanized monoclonal antibody that is FDA-approved for Crohn's disease (CD) and relapsing forms of multiple sclerosis (MS). It is generally recommended for patients who have had an inadequate response, or are unable to tolerate, an alternative MS therapy. Fatal progressive multifocal leukoencephalopathy (PML) has occurred in patients who received natalizumab. Natalizumab is given as a 300 mg intravenous infusion every 4 weeks, and the 2012 wholesale acquisition cost (WAC) is $3,921. The WAC of natalizumab has increased almost 40% over the last 2 years.

OBJECTIVE: To evaluate natalizumab utilization patterns and to identify utilization management opportunities.

METHODS: Pharmacy and medical claims data from approximately 8.1 million commercially insured members were queried for 12 months from July 1, 2010, to June 30, 2011. The individual's first natalizumab claim was defined as the index claim. Quarterly total paid natalizumab costs, unique utilizers, and claims trends were assessed. Natalizumab initiators' diagnoses were identified from an evaluation of all medical claim ICD-9-CM codes during July 1, 2010, to June 30, 2011. A new natalizumab user was defined as not having had a natalizumab claim in the 6 months prior to the index claim. All claims among new users continuously enrolled for 6, 24, and 60 months prior to the index claim were assessed for evidence of an alternative MS drug.

RESULTS: Natalizumab utilization appeared stable at 754 (range 736 to 780) utilizing members per 8.1 million commercially insured lives per quarter during the 12 months of analysis (July 1, 2010, to June 30, 2011).

Claims utilization was flat at 2,076 claims per quarter (range 2,019 to 2,138). Total 12-month natalizumab expenditures were $26,669,927 of which $26,407,773 (99.0%) was paid via the medical benefit. The natalizumab total paid per member per month (PMPM) increased from $0.24 in 2010 Q3 to $0.30 in 2011 Q2 consistent with the manufacturer price increases. All members had a medical claim with an ICD-9-CM diagnosis code for MS, and 5 (2.4%) also had medical claims for CD. In the 6-month follow-up, 50.7% of natalizumab new initiators did not have a history of an alternative MS agent claim. The percentage of members with no alternative MS agent decreased to 39.0% and 26.3% for 24- and 60-months follow-up, respectively (see table).

CONCLUSIONS: Management of the specialty MS drug natalizumab requires an integrated evaluation using both medical and pharmacy claims. The 25% natalizumab PMPM increase was largely due to manufacturer price increases. Health insurers can expect to face continued price increases despite flat utilization trends. Since 1 in 4 members newly initiating natalizumab did not have evidence of an alternative MS agent claim over 5 years, a medical policy or prior authorization encouraging a trial of an alternative MS agent before natalizumab may improve the quality of care by reducing the risk of natalizumab-induced life-threatening PML.

SPONSORSHIP: This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

Evaluation of Pharmacist Knowledge and Attitude Toward Pharmacogenomics

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BACKGROUND: Pharmacogenomics is defined as the collection of genomic factors that influence an individual’s variability to drug response, including absorption, metabolism, distribution, excretion, and targeted enzyme-substrate activity. Pharmacogenomics has the potential to shift current guidelines in patient care practices. Personalized pharmacogenomics-targeted pharmaceuticals involve the use of drug companion tests and other genetic tests to increase drug efficacy while minimizing unwanted side effects by identifying biomarkers in patients early in the course of drug treatment. Pharmacists are experts in drug therapies and thus are the most logical healthcare professionals to bridge and integrate pharmacogenomics into drug therapy management.

OBJECTIVE: To develop and conduct a survey to assess pharmacists’ knowledge of approved oncology pharmacogenomic companion tests and attitude toward pharmacogenomic tests in general.

METHODS: An electronic survey was utilized to collect data on demographics, knowledge base, and attitudes toward pharmacogenomic tests approved oncology companion tests on the market and distributed to pharmacists through state pharmacy organizations and alumni associations beginning in May 2012 and continuing through July 2012. The survey evaluated demographic data, attitudinal scales, a 12-item pharmacogenomic knowledge test, and policy/utilization data at their respective organizations. The study was approved by the Investigational Review Board of the University of Texas.

RESULTS: Analysis of 104 returned surveys was conducted. Of the pharmacists surveyed, 31% indicated that they work in a managed care/health plan institution or have managed care as a specialty practice area; 20% had previous coursework or continuing education in pharmacogenomics; and 39% were aware of existing policies on pharmacogenomic tests at their institutions. The average score on the knowledge test was 2.7 (maximum score of 12). Pharmacists who have engaged in prior pharmacogenomic continuing education or coursework scored higher than those without prior education in this area (P<0.0001). Also, pharmacists who have knowledge of existing institutional policies surrounding pharmacogenomics scored higher than those who did not know of or have institutional policies (P<0.0008). Additionally, 46% of the respondents indicated that pharmacists are the best equipped health care provider to receive and interpret pharmacogenomic test results that relate to a patient’s drug therapy management.

TABLE

| Table: Natalizumab New Users: Pharmacy or Medical Claims for Alternative Multiple Sclerosis (MS) Drugs Found 5 Years Prior to Their Index Natalizumab Claim |
|-------------------------------|-------------------------------|-------------------------------|
| 6-Month Continuous Enrollment (n = 209) | 24-Month Continuous Enrollment (n = 141) | 60-Month Continuous Enrollment (n = 38) |
| Glatiramer (Copaxone) | 41 (19.6%) | 39 (27.7%) | 13 (34.2%) |
| Interferon beta-1a (Rebif) | 24 (11.5%) | 33 (23.4%) | 12 (31.6%) |
| Interferon beta-1a (Avonex) | 19 (9.1%) | 25 (17.7%) | 12 (31.6%) |
| Interferon beta-1b (Betaseron) | 23 (11.0%) | 20 (14.2%) | 5 (13.2%) |
| Any of the above | 103 (49.3%) | 86 (61.0%) | 28 (73.7%) |
| No alternative MS agent | 106 (50.7%) | 55 (39.0%) | 10 (26.3%) |

*New start to natalizumab was defined as no natalizumab claim in the 6 months prior to the index claim. No member had a claim for fingolimod or mitoxantrone in the follow-up periods.
CONCLUSIONS: The findings in this study indicate that pharmacists are more likely to answer correctly about approved oncology-related pharmacogenomic tests if they have previous education and are exposed to policies dealing with pharmacogenomics at their workplace. However, for the overall target population, there is still a great need for pharmacy continuing education and training programs in this area.

SPONSORSHIP: This research was conducted by OptumInsight, Minneapolis, MN, without external funding.

Existence and Impact of Geographic Access-Spillover on Drug Sales

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BACKGROUND: We have conducted this study to provide a resource for interested parties, since managed care organizations (MCOs) and pharmaceutical manufacturers increasingly request research surrounding the impact of managed care formulary coverage on access-spillover. Spillover is the enhancement in product sales expected to be observed in a particular geography that occurs when prescribers in that geography choose to prescribe a specific product over competing products because prescribers perceive that their patients are likely to enjoy preferred formulary coverage and thus reduced patient cost burden for that product. Interest in this phenomenon is particularly pronounced given its implications for increased magnitude of manufacturer pricing rebates that may be offered to MCOs in return for a product’s preferred formulary access.

OBJECTIVE: To confirm the existence of the geographic access-spillover effect and evaluate its magnitude in a specific situation.

METHODS: By examining prescription data from a prominent national MCO, which allows preferred formulary access for a metabolic product, we calculated MCO-specific product market share against product competitors across multiple geographies, each of which had different percentage levels of overall preferred access in each specific geography. We repeated this analysis using prescription data from a second national MCO that allows nonpreferred formulary access to the same product. For each of these two datasets, market share of the metabolic product versus the percentage of overall preferred access in each specific geography, and regressions were created to calculate the incremental impact of the product’s geographical preferred access levels on the product’s MCO-specific market share.

RESULTS: The slopes of MCO-specific product market share versus geographical preferred access were 0.34% and 0.54% market share per percentage geography-specific preferred access at the accounts allowing the product preferred access and nonpreferred access, respectively (P=0.009, P=0.008).

CONCLUSIONS: The positive relationship between the product’s preferred geographical formulary access and increased MCO-specific market share at both the MCO preferring the product and MCO not preferring the product provides evidence in support of the existence of an access-spillover effect. Additionally, the slopes of the market share regressions provide some indication of the magnitude of this effect’s impact when applied to the MCO-specific market share of a product in both a preferred and nonpreferred formulary position.

SPONSORSHIP: This research was conducted by SkyLaunch Advisors, New York, NY, without external funding.

Final Results from the Multicenter COMPACT Study of Complications in Patients with Sickle Cell Disease and Utilization of Iron Chelation Therapy: A Retrospective Medical Records Review

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BACKGROUND: Despite declining mortality, complication rates remain high among adult sickle cell disease (SCD) patients. Previous studies suggest that caring for adults with SCD is a major challenge in the United States, since patients often become disconnected from the health care establishment when transitioning from pediatric care due to the paucity of adult providers knowledgeable in SCD and fragmentation in coordinated care. Consequently, inpatient hospitalizations (IP) and emergency room (ER) visits among adult SCD patients may be higher than expected. Resource use data among adult SCD patients is scant.

OBJECTIVE: To evaluate transfusion burden, complication rates, chelation (ICT) patterns, and associated resource utilization in SCD patients ≥16 years with a focus on young adults (16-30) in order to understand the impact on health outcomes during the transition from pediatric to adult care.

METHODS: Medical records of 254 SCD patients ≥16 were retrospectively reviewed between August 2011 and July 2012 at three U.S. tertiary care centers. Patients were classified into cohorts based on cumulative units of blood transfused and history of ICT: <15 units and no ICT (Cohort 1 [C1]), ≥15 units and no ICT (Cohort 2 [C2]), and ≥15 units and receiving ICT (Cohort 3 [C3]). SCD complication rates were expressed as the number of SCD complications per patient per year (PPPY); rate ratios (RRs) were used for cohort comparisons. For the young adult subset, only complications and resource utilization observed between ages 16 and 30 were analyzed.

RESULTS: The transfusion rate decreased from 10.9 units PPPY at age 16 to 1.0 unit PPPY at age 45. The rate (95% CI) of any SCD complications PPPY was highest in C2: 3.02 (2.89-3.14), followed by C3: 2.26 (2.16-2.37), then C1: 1.66 (1.54-1.77). In patients ≥16, pain was the most frequent complication and the most common reason for IP (76%) and ER (82%) visits, followed by infections IP (6.3%) and ER (6.5%). Infections were more prevalent in young adults (ER [8.2%], IP [7.0%]); priapism was more common in patients >30 for ER visits (3.4%). Among transfused patients (C2+C3), those receiving ICT were less likely to experience SCD complications than those who did not (rate ratio [RR] [95% CI] C2 vs. C3: 1.33 [1.25-1.42]). Similar trends were observed in ER and IP visits associated with SCD complications (RR [95% CI], C2 vs. C3, ER: 1.94 [1.70-2.21], IP: 1.61 [1.45-1.78]), but not in outpatient (OP) visits. These trends were more pronounced in young adults. SCD complication rates were greater in C1 and C2 versus C3 in most settings (RR [95% CI], C1 vs. C3, OP: 1.39 [1.15-1.68], IP: 0.94 [0.78-1.14], ER: 1.50 [1.23-1.83], C2 vs. C3, OP: 0.85 [0.70-1.02], IP: 1.93 [1.69-2.21], ER: 2.45 [2.10-2.87]).

CONCLUSIONS: Complication rates and associated IP and ER visits were higher among transfused (C2+C3) SCD patients ≥16 years. Among transfused patients, those receiving ICT were less likely to experience complications than those without ICT. This trend was more pronounced in young adults, suggesting greater vulnerability of this population, potentially due to discrepancy in care as patients transition from pediatric to adult care. These results highlight the need for increased patient and provider education and support through transition and adulthood to reduce the complication burden that may be related to poorly or untreated iron overload in transfused individuals with SCD.
Formulary Decision Makers’ Perceptions Regarding Value of Adherence Programs and Associated Outcomes Studies

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BACKGROUND: Three-quarters of Americans who take prescription medications have been reported to be nonadherent to their regimens in 1 or more ways. The clinical and economic impact of nonadherence continues to be significant, with an estimated cost of over $100 billion annually to the health care system. Programs designed to improve adherence are at the forefront of efforts to improve outcomes; however, the perceived value formulary decision makers place on these programs and the studies conducted to evaluate the effectiveness of these interventions remains unclear.

OBJECTIVE: To describe formulary decision makers’ perceptions of adherence outcomes studies, drug manufacturer-sponsored adherence programs, and the value of these programs, and the influence of program evaluation studies on formulary decisions.

METHODS: Approximately 500 payer decision makers were invited to participate in a web-based survey. To be included in the study, respondents had to (a) be a clinician, (b) work for a health plan, and (c) be directly involved in formulary decision making. The survey consisted of 29 multiple choice or open-ended questions. A case study of the HereToHelp program, a support program for patients taking buprenorphine for opioid dependence, was included as an example of a drug manufacturer-sponsored adherence program. Descriptive statistics were used for data analysis, with results presented as counts and percentages.

RESULTS: A total of 24 respondents met the inclusion criteria and participated in the study (response rate: 4.8%). Respondents were primarily pharmacy directors (87.5%) with an average of 8.2 years in their current positions. Seven respondents (29.2%) indicated they had been presented with outcomes data for programs similar to that in the case study example, with 6 indicating they had utilized those data to make formulary decisions. Over 54% answered they had been directly involved with the analysis of an adherence outcomes study. Two respondents indicated their organizations currently contracted with a drug manufacturer on an outcomes-based contract, and over 70% stated their organizations provided adherence program enrollment to their members. Respondents’ beliefs regarding the impact of drug manufacturer-sponsored adherence programs in reducing overall health plan spending and the credibility of adherence outcomes studies of such programs were either positive or neutral by a majority of respondents. In order to consider coverage action of a bundled branded product with an adherence program, 52.2% stated a > 15% improvement in adherence with the program over standard of care would need to be realized.

SPONSORSHIP: This study was funded by Novartis Pharmaceuticals Corporation, East Hanover, NJ.

| TABLE Rate and Rate Ratios of SCD Complications by Setting |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 |                 | All Patients    |                 |                 |                 |                 |
|                 | C1             | C2             | C3             | RR              |                 |                 |
|                 | n = 69         | n = 91         | n = 94         | C1 vs. C3       | C2 vs. C3       |                 |
| Total           |                 |                 |                 |                 |                 |                 |
| Mean ± SD       | 11 ± 13        | 25 ± 53        | 18 ± 38        | 0.73            | 1.33            |
| Rate PPPY [95% CI] | 1.66 [1.54 - 1.77] | 3.02 [2.89 - 3.14] | 2.26 [2.16 - 2.37] | [95% CI] [0.67 - 0.80] | [1.25 - 1.42] |
| Outpatient      |                 |                 |                 |                 |                 |                 |
| Mean ± SD       | 4 ± 6          | 7 ± 14         | 0 ± 16         | 0.81            | 1.01            |
| Rate PPPY [95% CI] | 0.65 [0.57 - 0.72] | 0.80 [0.74 - 0.87] | 0.80 [0.73 - 0.86] | [95% CI] [0.71 - 0.94] | [0.90 - 1.13] |
| Inpatient       |                 |                 |                 |                 |                 |                 |
| Mean ± SD       | 3 ± 4          | 10 ± 22        | 6 ± 13         | 0.56            | 1.61            |
| Rate PPPY [95% CI] | 0.42 [0.36 - 0.48] | 0.76 [0.70 - 0.82] | 0.48 [0.41 - 0.50] | [95% CI] [0.36 - 0.68] | [1.45 - 1.78] |
| Emergency room  |                 |                 |                 | 1.12            | 1.94            |
| Mean ± SD       | 3 ± 6          | 7 ± 23         | 4 ± 11         | 1.12            | 1.94            |
| Rate PPPY [95% CI] | 0.51 [0.45 - 0.58] | 0.88 [0.82 - 0.95] | 0.76 [0.69 - 0.85] | [95% CI] [0.95 - 1.33] | [1.70 - 2.21] |

C = cohort; CI = confidence interval; PYPY = per patient per year; RR = rate ratios; SCD = sickle cell disease; SD = standard deviation.

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became generically available. 47.8% stated they would consider continued coverage of the bundled branded product plus adherence program if presented with a robust outcomes study demonstrating superior impact on adherence. A concern most frequently highlighted as possible bias to study results was manufacturer involvement and influence.

CONCLUSIONS: Most payer decision makers were positive or neutral about the impact drug manufacturer-sponsored adherence programs may have in reduction in spending and the credibility or believability of the associated outcomes studies. However, if presented with robust data, most were willing to take some coverage action.

SPONSORSHIP: This research was conducted by NucleusX Market Access, Atlanta, GA, without external funding.

Gender Differences in Health-Related Quality-of-Life and Kessler 6 Index for Patients with Alzheimer’s Disease in the United States

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BACKGROUND: Alzheimer’s disease (AD) is the sixth leading cause of death in the United States, affecting more than 5 million of the American geriatric population. Gender tends to play an important role in AD for many factors including disease progression, psychological well-being, and health-related quality of life (HRQOL).

OBJECTIVE: To examine gender differences in HRQOL using the Short-Form 12 (SF-12) and the Kessler index (K6) for Medicare beneficiaries with AD in the U.S. civilian noninstitutionalized population.

METHODS: A cross-sectional analysis was conducted using the national Medical Expenditures Panel Survey data (MEPS). Study subjects included patients who reported having Medicare as well as receiving at least 1 FDA-approved AD prescription drug in U.S. outpatient settings during 2009. The dependent variables for the analyses were 18 variables describing HRQOL outcomes from SF-12 and K6 questionnaires. A series of weighted Wald chi-square statistics were used to test the effect of gender on each variable. Weighted univariate statistics also were applied to examine gender differences in overall mental (MCS) and physical components (PCS) scores. All analyses were accomplished by taking into consideration the MEPS sample weight, stratification, and clustering variables by SAS 9.22 analytical software.

RESULTS: There were an estimated 42.49 million Medicare recipients from 2009 MEPS, of which 1.4 million (3.33%) patients received at least one AD prescription during an outpatient visit. The majority of the AD patients were female (64.03%) with average age of 78.8. Comparison of MCS for male (M=44.5, SE=1.93) and female (M=44.9, SE=1.32) revealed no significant differences between the groups (P=0.85). In comparison with PCS, males illustrated higher physical scores (M=36.6, SE=1.97) than females (M=32.4, SE=1.28). However, there is no significant difference between the groups (P=0.06). The results from the (K6) also showed no significant difference in psychological distress measures between male and female AD patients. All mean HRQOL scores (PCS, MCS, K6) in both male and female AD groups were lower than the national norm of 50.

CONCLUSIONS: The study findings indicated that HRQOL in AD is impaired, but with no significant difference between male and female in both the SF-12 and K6 among Medicare AD patients. Two factors may explain the findings: (a) Given AD has been undersampled in the MEPS database, a significant difference may not be established, and (b) limitations of using the SF-12 questionnaire in mental health. However, our study makes a significant contribution in providing a broader picture of HRQOL and psychological distress of AD from national representative data.

SPONSORSHIP: This research was conducted by Nova Southeastern University, Fort Lauderdale, FL, without external funding.

Health Care Costs Among Asthma Patients on Budesonide/Formoterol Combination and Fluticasone/Salmeterol Combination

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BACKGROUND: The impact of different inhaled corticosteroid and long-acting beta agonist (ICS/LABA) combination treatments on health care costs among asthma patients remains uncertain.

OBJECTIVE: To evaluate the impact of different ICS/LABA combination therapies on asthma-related and all-cause costs among asthma patients in a U.S. managed care population.

METHODS: From HealthCore Integrated Research Database, asthma patients aged 12-64 years, who initiated budesonide/formoterol combination (BFC) or fluticasone/salmeterol combination (FSC) between June 1, 2007, and September 30, 2010, were identified and matched using propensity score methods. Patients who previously used ICS/LABA combination therapy were excluded. Asthma-related and all-cause resource utilization and costs were estimated during the 12-month pre/post ICS/LABA treatment initiation. Gamma regression was used for cost assessment.

RESULTS: Of the 3,122 BFC and 8,177 FSC patients identified, 3,043 BFC and FSC patients were matched. Cohorts were well balanced on all baseline characteristics and pre-index asthma medication use; however, there was a difference in pre-index average total cost ($7,416 for BFC vs. $8,031 for FSC [95% unadjusted CI,$970, −$244]) and in asthma-related cost ($1,818 for BFC vs. $1,964 [95% unadjusted CI,$238, −$48]) and in asthma-related inpatient costs ($341 for BFC vs. $434 [95% unadjusted CI,$137, −$44]). During the 12 months after initiation, asthma-related emergency department costs were higher within BFC patients (mean difference, $14 [95% CI,$2, $29]). However, asthma-related inpatient hospitalization costs were higher within FSC patients (mean difference, $37, −$44, −$29). Among patients with ≥1 hospitalization, average inpatient costs were found to be significantly higher in the FSC cohort (mean difference, $6,254 [95% unadjusted CI,$8,621,$3,419]). The all-cause health care cost was lower for BFC patients (mean difference, $949 [95% adjusted CI,$1,321,$553]).

CONCLUSIONS: This is the first U.S. study to use administrative claims data to compare health care costs for asthma patients receiving BFC or FSC. In this study, average total cost of care was increased after initiation of therapy in both cohorts, with the increase being more pronounced in FSC patients. BFC treatment was associated with comparable asthma-related health care costs with FSC during the 12 months after initiation.

SPONSORSHIP: This research was conducted by AstraZeneca LP, Wilmington, DE, without external funding.

Health Care Expenditure Burden Among Elderly Patients with Cancer

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METHODS: From the Medicare Current Beneficiary Survey (MCBS), a 12-month retrospective study was conducted to compare health care costs for asthma patients receiving BFC or FSC. In this study, average total cost of care was increased after initiation of therapy in both cohorts, with the increase being more pronounced in FSC patients. BFC treatment was associated with comparable asthma-related health care costs with FSC during the 12 months after initiation.

RESULTS: The all-cause asthma-related health care cost was lower for BFC patients (mean difference, $949 [95% adjusted CI,$1,321,$553]).

CONCLUSIONS: This is the first U.S. study to use administrative claims data to compare health care costs for asthma patients receiving BFC or FSC. In this study, average total cost of care was increased after initiation of therapy in both cohorts, with the increase being more pronounced in FSC patients. BFC treatment was associated with comparable asthma-related health care costs with FSC during the 12 months after initiation.

SPONSORSHIP: This research was conducted by AstraZeneca LP, Wilmington, DE, without external funding.

Health Care Costs Among Asthma Patients on Budesonide/Formoterol Combination and Fluticasone/Salmeterol Combination

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BACKGROUND: The impact of different inhaled corticosteroid and long-acting beta agonist (ICS/LABA) combination treatments on health care costs among asthma patients remains uncertain.

OBJECTIVE: To evaluate the impact of different ICS/LABA combination therapies on asthma-related and all-cause costs among asthma patients in a U.S. managed care population.

METHODS: From HealthCore Integrated Research Database, asthma patients aged 12-64 years, who initiated budesonide/formoterol combination (BFC) or fluticasone/salmeterol combination (FSC) between June 1, 2007, and September 30, 2010, were identified and matched using propensity score methods. Patients who previously used ICS/LABA combination therapy were excluded. Asthma-related and all-cause resource utilization and costs were estimated during the 12-month pre/post ICS/LABA treatment initiation. Gamma regression was used for cost assessment.

RESULTS: Of the 3,122 BFC and 8,177 FSC patients identified, 3,043 BFC and FSC patients were matched. Cohorts were well balanced on all baseline characteristics and pre-index asthma medication use; however, there was a difference in pre-index average total cost ($7,416 for BFC vs. $8,031 for FSC [95% unadjusted CI,$970, −$244]) and in asthma-related cost ($1,818 for BFC vs. $1,964 [95% unadjusted CI,$238, −$48]) and in asthma-related inpatient costs ($341 for BFC vs. $434 [95% unadjusted CI,$137, −$44]). During the 12 months after initiation, asthma-related emergency department costs were higher within BFC patients (mean difference, $14 [95% CI,$2, $29]). However, asthma-related inpatient hospitalization costs were higher within FSC patients (mean difference, $37, −$44, −$29). Among patients with ≥1 hospitalization, average inpatient costs were found to be significantly higher in the FSC cohort (mean difference, $6,254 [95% unadjusted CI,$8,621,$3,419]). The all-cause health care cost was lower for BFC patients (mean difference, $949 [95% adjusted CI,$1,321,$553]).

CONCLUSIONS: This is the first U.S. study to use administrative claims data to compare health care costs for asthma patients receiving BFC or FSC. In this study, average total cost of care was increased after initiation of therapy in both cohorts, with the increase being more pronounced in FSC patients. BFC treatment was associated with comparable asthma-related health care costs with FSC during the 12 months after initiation.

SPONSORSHIP: This research was conducted by AstraZeneca LP, Wilmington, DE, without external funding.
BACKGROUND: It is estimated that about 1.6 million men and women in the United States will be diagnosed with cancer of all sites in 2012. Prevalence of cancer and associated mortality is higher in the elderly population. With the increasing health care costs, payers are interested in understanding the economic burden of cancer and factors associated with the high cost of cancer.

OBJECTIVE: To examine the health care utilization and expenditure burden in elderly patients with cancer.

METHODS: We used Medicare Current Beneficiary Survey (MCBS) Cost and Use file from years 2000 to 2007. The survey, which is also linked to the claims data, provides information on elderly health care use, expenditure, and demographic characteristics. Patients with cancer were identified from self-reports for the diagnosis. The following measures of utilization and expenditure were assessed: all-cause hospitalization, outpatient visits, and total (sum of hospitalization and outpatient) expenditure. Multivariate Poisson regression models (for number of visits) and generalized linear models with log link and gamma family (for expenditure data) were used to assess the effect of patient’s characteristics on inpatient, outpatient, and total expenditure.

RESULTS: In the years studied, about 15,725 patients were reported with a cancer diagnosis. Of these, 50.0% were female; 95.4% were white; 20.9% had no high school education; 62.6% were married. The average income was about $38,063 (SD $79,857), and mean age was 76 years. Average number of outpatient visits was 4.8 (SD 8.5), and average number of hospitalization was 0.33 (SD 0.81) per year. In multivariate regression (Poisson) models, number of outpatient visits were higher for females (P < 0.001), those in poor health (P < 0.001), and among elderly with college education (P < 0.001), whereas inpatient visits were lower among females (P = 0.015), college education had no effect (P = 0.689); and those in poor health had higher expenditure (P < 0.001). Mean total expenditure in this population was about $7,888 (SD $14,004) per year. In multivariate regression models, females had lower expenditure compared with males (P = 0.020), and higher education had no statistically significant effects, where those in poor health reported statistically significant higher expenditure (P < 0.001).

CONCLUSIONS: Studies have indicated that Medicare beneficiaries with cancer have higher expenditure compared with similar noncancer patients. From this study, we found that gender, health status, and education level were important predictors of health care utilization among elderly cancer patients. Not surprisingly, those in poor health had higher health care expenditures. We also found that outpatient and hospitalization are not always complementary, and higher outpatient visits may actually act as a substitute for more costly hospitalization.

SPONSORSHIP: This research was conducted by Oxford Outcomes, an ICON plc company, Morristown, NJ, without external funding.

Health Care Resource Utilization Following Initiation of a Triptan

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BACKGROUND: Triptans are often the first prescription treatment chosen for patients suffering from migraines. The efficacy of triptans has been established in clinical trials, but real-world evidence has shown that adherence and persistence rates are generally poor. Measuring the impact of initiating a triptan on health care resource utilization (HRU) is a potential way of measuring the value of these medications outside of the clinical trial setting.

OBJECTIVE: To measure changes in the utilization of medical services and prescription medications following initiation of a triptan.

METHODS: A large, nationally representative database of medical and pharmacy claims was used to identify patients with a diagnosis of migraine who had recently begun triptan therapy. As a secondary analysis, results were stratified by the number of triptans used and...
Hepatitis C Specialty Drug Utilizers Cost of Care Trends 2008 to 2011: An Integrated Medical and Pharmacy Claims Analysis

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BACKGROUND: The 2011 FDA approval of protease inhibitors (boceprevir and telaprevir) to treat Hepatitis C (Hep C) resulted in the Hep C treatment recommendation becoming triple therapy with a protease inhibitor, alpha interferon, and ribavirin. Health plans need an understanding of the total cost of care and specialty drug cost trends in order to prioritize clinical and utilization management program development.

OBJECTIVE: To describe the cost of care trends among commercially insured individuals utilizing a Hep C specialty drug stratified by specialty and nonspecialty costs within the medical and pharmacy (Rx) benefits.

METHODS: Integrated Rx and medical claims data from 1.2 million commercially insured members were queried. Members were required to be age 0 to 64 and continuously enrolled for a full year during 2008, 2009, 2010, or 2011. Presence of a Hep C diagnosis was defined as the following: (a) 2 or more medical claims with a Hep C ICD-9-CM diagnosis code, (b) 1 medical claim with Hep C and one Hep C drug claim, or (c) 2 or more Hep C drug claims. Only those drugs approved by the FDA for Hep C were used in the diagnosis criteria and included the following: boceprevir, peginterferon alfa-2a, peginterferon alfa-2b, ribavirin, and telaprevir. Each year the prevalence of members with a Hep C diagnosis and the subset with a Hep C specialty drug claim were identified. Among members using Hep C specialty drugs, the average per patient per year total cost of care was calculated. Total cost of care was separated into 4 categories, medical Hep C specialty drug, medical all other, pharmacy Hep C specialty drug, and pharmacy all other.

RESULTS: The sample consisted of 9,521 patients, 18.9% of whom tried more than 1 triptan during follow-up. Tripttan initiation was not associated with a significant reduction in HRU. Among patients who used 2 unique triptans, the rates of ER visits and hospitalizations were significantly higher during the post-tripttan period (P=0.01 and P=0.02, respectively). Among all patients, tripttan initiation was followed by significant increases in the average number of fills for opioids (P<0.01), acetaminophen/NSAIDs (P<0.01), and migraine prophylaxis medications (P<0.01). Patients who used concomitant opioids were more likely to use the ER (P<0.01) or be hospitalized (P<0.01). Concomitant opioid users also filled more acetaminophen/NSAIDs (P<0.01) and migraine prophylaxis medications (P<0.01), compared with nonopioid tripttan users.

CONCLUSIONS: Our results show that the use of tripttans does not reduce HRU. Particularly among patients who switched tripttans and patients who used opioids concomitantly with their tripttan, significant increases in pharmacy and medical utilization were seen. Further research is needed to better understand persistence and satisfaction with tripttans, both of which may be drivers of HRU.

SPONSORSHIP: This research was conducted by Allergan, Inc, Irvine, CA, without external funding.

Immunosuppressant Waste Associated with 90-Day Supplies Compared with 30-Day Supplies of Calcineurin Inhibitors

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RESULTS: Hep C diagnosis prevalence was 97 per 100,000 continuously insured members in 2008 (995 of 1,026,844) and decreased slightly to 91 per 100,000 in 2011 (887 of 971,534). Hep C specialty drug use among members with a diagnosis declined steadily from 171 (17.2%) of 995 members in 2008 to 106 (12.2%) of 868 members in 2010 and then increased in 2011 to 125 (14.1%) of 887 members, 13 per 100,000. Despite the overall decrease in Hep C specialty drug utilization from 2008 to 2011, the total cost of care CAGR was 15.0% from 2008 to 2011. Specifically, the Hep C specialty pharmacy CAGR was 31.8% from 2008 to 2011. (figure). Other all medical costs were $20,154 in 2008 and increased to $22,453 in 2011, CAGR 3.7%. Hep C specialty drug costs were 99.8% from the Rx benefit. Hep C specialty drug costs accounted for 35.0% ($13,332 of $38,055) total cost of care in 2008 and was substantially higher at 52.6% in 2011 ($30,415 of $57,799), CAGR 31.8%.

CONCLUSIONS: In 2011, although only 13 per 100,000 continuously insured members were treated with a specialty Hep C drug, their annual average per patient specialty Hep C drug cost was $30,415, which accounted for more than 52% of the total cost of care. The shift from Hep C specialty drugs, accounting for one-third of the total cost of care, to more than half was the result of boceprevir and telaprevir availability in mid-2011. Health insurers need to develop Hep C management programs to ensure the most cost-effective therapy is used.

SPONSORSHIP: This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.
BACKGROUND: The immunosuppressant calcineurin inhibitors ciclosporine (Neoral, Sandimmune, Gengraf) and tacrolimus (Prograf, Hecoria) are frequently used to reduce the risk of rejection after organ transplant. Calcineurin inhibitors represented approximately 50% of the $0.48 per member per month immunosuppressant spend in 2011 among Prime Therapeutics’ 9 million commercially insured lives. Medication waste, as a result of a drug switch, is a concern for prescriptions, especially with supplies beyond the traditional 30 days. Immunosuppressant pharmacotherapy frequently requires a combination of drugs; however, only 1 calcineurin should be used at a time. Switching between calcineurins could result in medication waste.

OBJECTIVE: To examine and quantify the presence of calcineurin inhibitor waste associated with these channels: retail 30 days supply (DS), retail 90 DS, and mail order 90 DS.

METHODS: Among 9 million commercially insured members, first calcineurin claims were identified during January 1, 2011, to June 30, 2011, and defined as index drugs and dates. Members with an index calcineurin claim were identified during January 1, 2011, to June 30, 2011, retail 30, retail 90, or mail 90. An end date for each claim was defined as fill date plus days supply. During the post-index claim analysis period, the presence of an overlapping days supply with the alternative calcineurin agent was defined as waste. Days of overlap waste was quantified, and average days per claim within a channel was calculated. The prevalence of claims with waste by channel was statistically compared using the chi-square Fischer's Exact test. Members’ medical claims ICD-9-CM codes were queried during the 2 years prior to index date to identify diagnoses and hierarchically ordered: organ or tissue transplant, other immune disorders, chronic kidney disease (CKD), all other diagnoses, and lastly no medical claims.

RESULTS: Among the first half of 2011, 5,703 (0.06%) members were identified with 48,730 calcineurin claims during an up-to-365-day follow-up. Tacrolimus represented 34,355 (70.5%) of claims, and ciclosporine represented 14,375 (29.5%) of claims. Members channel use was retail 30 only 4,197 (73.6%), retail 30/90 90 both 513 (9.0%), mail order 90 only 354 (6.2%), and all other combinations 206 (3.6%). The hierarchy of diagnoses was transplant in 4,340 (76.1%) members, immune disorders in 314 (5.5%), CKD in 205 (3.6%), other medical claims in 456 (8.0%), and no medical claims in 1,192 (20.5%) members. Overlapping ciclosporine and tacrolimus supply occurred with 59 (0.12%) of the 48,730 claims, 12 (0.42%) of 2,826 retail 90 claims, 46 (0.11%) of 43,224 retail 30 claims, and 1 (0.04%) of 2,680 mail order claims (P<0.01).

CONCLUSIONS: Among ciclosporine and tacrolimus utilizers followed for up to 365 days, ciclosporine or tacrolimus waste due to overlapping supply was rare with 1 in 870 claims associated with waste. Although claims associated with waste were rare, when waste was found it was 10 times more likely to be a retail 90-day supply claim, then a retail 30 or mail 90 claim (P<0.01). Because post-transplant immunosuppressant therapy generally stabilizes at 1 year, and more than 3 of 4 individuals with a ciclosporine or tacrolimus claim had a transplant diagnosis, consideration can be given to encouraging mail order use due to the low waste rate found and potential to improve adherence.

SPONSORSHIP: This research was conducted by Prime Therapeutics LLC, Eagan MN, without external funding.

Impact of a Linezolid (Zyvox) Prior Authorization Program: Clinical and Economic Outcomes

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BACKGROUND: Guidelines from the Infectious Disease Society of America do not recommend linezolid as a first-line agent but to reserve linezolid as an alternative for vancomycin- or methicillin-resistant strains of enterococcus, staphylococcus, or streptococcus. A prior authorization (PA) program could help ensure appropriate use of linezolid; however, a negative effect of the PA could be that members choose to forego all therapy.

OBJECTIVE: To assess the impact of a linezolid PA program on utilization, total cost of care, and hospitalization/emergency room (ER) visits compared with a concurrent comparison group not exposed to the PA.

METHODS: Intervention population pharmacy claims among 1.2 million commercially insured members exposed to a linezolid PA were queried for a rejected linezolid claim between January 1, 2011, and June 30, 2011. Members were required to be continuously enrolled for 6 months prior to their first (index) rejected claim. Members were followed for 30 days. A comparison group without the linezolid PA was identified from 1.1 million users using the same methodology with the exception that their index linezolid claim was paid. For both groups, all pharmacy and medical claims were queried in the previous 6 months and 30-day follow-up for presence of linezolid and any other antibiotics. The following outcomes were assessed during the 30-day follow-up: linezolid claim, other antibiotic claim, hospitalizations, ER visits, all outpatient visits, total medical and pharmacy costs, and linezolid costs. Infectious disease diagnoses from medical claim ICD-9-CM codes in the 6 months prior to the index date were hierarchically ranked. Comparisons were performed with the ANOVA test for normally distributed continuous variables, the chi-square test for categorical variables, the Wilcoxon rank sum test for counts, and the Likelihood ratio test on expenditures comparisons.

RESULTS: In the intervention group, 217 (2 per 10,000) members had a rejected linezolid claim during June 1, 2011, to June 30, 2011, and 185 (85.3%) met continuous enrollment criteria. The comparison group had <0.01). Because post-transplant immunosuppressant therapy generally stabilizes at 1 year, and more than 3 of 4 individuals with a ciclosporine or tacrolimus claim had a transplant diagnosis, consideration can be given to encouraging mail order use due to the low waste rate found and potential to improve adherence.

Sponsorship: This research was conducted by Prime Therapeutics LLC, Eagan MN, without external funding.

Table: Clinical and Economic Outcomes During 30-Day Follow-Up

<table>
<thead>
<tr>
<th></th>
<th>Intervention (n = 185)</th>
<th>Comparison (n = 69)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>46 (17)</td>
<td>45 (18)</td>
<td>0.633</td>
</tr>
<tr>
<td>Male</td>
<td>94 (50.8%)</td>
<td>34 (49.3%)</td>
<td>0.828</td>
</tr>
<tr>
<td>Linezolid claim</td>
<td>99 (53.5%)</td>
<td>69 (100%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Other antibiotic claim</td>
<td>58 (31.4%)</td>
<td>0 (0%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No antibiotic claim</td>
<td>28 (15.1%)</td>
<td>0 (0%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Average linezolid cost</td>
<td>1,192 (1,478)</td>
<td>2,495 (1,877)</td>
<td>0.004</td>
</tr>
<tr>
<td>Average number of visits</td>
<td>3 (2.1)</td>
<td>2 (1.4)</td>
<td>0.332</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>27 (14.6%)</td>
<td>12 (17.4%)</td>
<td>0.582</td>
</tr>
<tr>
<td>Emergency room visit</td>
<td>34 (18.4%)</td>
<td>10 (14.5%)</td>
<td>0.467</td>
</tr>
<tr>
<td>Pharmacy and medical total costs, $ (SD)</td>
<td>7,943 (18,429)</td>
<td>12,132 (22,954)</td>
<td>0.020</td>
</tr>
</tbody>
</table>

SD = standard deviation.
77 (1 per 10,000) members with a paid linezolid claim, and 69 (89.6%) met criteria. Average time to first linezolid claim for 99 (53.3%) of 185 intervention group members was 2 days (standard deviation [SD] 3). Time to first linezolid or other antibiotic claim for 157 (84.9%) was 2 (SD 4) days. There were 28 (15.1%) intervention group members with no antibiotic claims in the 30-day follow-up. The average total paid per member for linezolid was $1,303 higher in the comparison group, $P=0.004$. Intervention group members had a nonsignificant 2.8% lower hospitalization rate ($P=0.582$), 3.9% higher ER visit rate ($P=0.467$), and on average 1 additional office visit ($P=0.332$). Average per member overall total costs of care were $4,189 lower in the intervention group ($P=0.020$). Vancomycin-resistant organisms were found in 1.7% versus 1.5%; methicillin-resistant S. aureus was found in 26.3% versus 38.2%; and an infection with an undefined organism found in 62.0% versus 45.6%, among intervention and comparison groups, respectively.

CONCLUSIONS: The linezolid PA program evaluated does not appear to be associated with a negative impact on medical outcomes as assessed by hospitalization/ER visits and was associated with lower costs.

SPONSORSHIP: This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

### Impact of Automated Prior Authorization Criteria for Short-Acting Narcotic Combinations in a Medicaid Population

**Sheen JV,* Williams A, Berringe R, Brink D, Driver R. Xerox State Healthcare, LLC, 16974 Riverdale Dr., Chesterfield, MI 63005; janelle.sheen@xerox.com, 636.519.4071**

**BACKGROUND:** The most commonly diverted controlled prescription drugs are narcotic pain relievers. The impact of drug diversion on the Medicaid program goes beyond just the cost of the prescriptions. The number of deaths related to narcotics has increased 98% from 2002-2006. Additionally, Missouri is the only state lacking a prescription drug monitoring program. The Affordable Care Act provides states with the ability to fight fraud and abuse with these medications. Automated prior authorization criteria for the short-acting (SA) narcotic combination agents were implemented on February 8, 2012, for the MO HealthNet (formerly Missouri Medicaid) Program.

**OBJECTIVE:** To describe the clinical impact of automated prior authorization criteria for SA narcotic combinations in the MO HealthNet population.

**METHODS:** A prior authorization edit was implemented at point-of-sale (POS) and at the member call center using SmartPATM, an electronic tool that interfaces with pharmacy and medical claims history, to make a clinical determination. SA narcotic combinations were approved based on history for cancer, chronic nonmalignant pain, or acute pain diagnosis and upon satisfying quantity limitations based on pediatric (age < 18) and adult dosing. Primary and secondary endpoints were evaluated 6 months before and 6 months after the edit was implemented.

### RESULTS:

A total of 393,640 members were evaluated by the edit in the 6-month post-period, with an 84% POS approval rate (328,946 members with approvals). Of the 64,694 members with claims denied at POS, 13% (8,478) were approved at the call center. The number of SA narcotic combination prescriptions exceeding the set quantity limits decreased by 97%; however, the number of targeted claims lacking an appropriate diagnosis rose 3%. Members using more than 2 pharmacies for SA narcotic combination prescriptions decreased by 5%, and those using three or more prescribers for these prescriptions decreased by 8%. Overall, the total number of targeted prescriptions decreased by 3% with an average cost savings per prescription of $0.46. Emergency room utilization decreased 8%, resulting in savings of $0.93 per member per month.

**CONCLUSIONS:** Implementation of an automated prior authorization edit for SA narcotic combination agents resulted in more clinically appropriate use of these agents, lowered the risk of doctor and pharmacy shopping habits, and decreased emergency room utilization.

**SPONSORSHIP:** This research was conducted by Xerox State Healthcare, LLC, Richmond, VA, without external funding.

### Impact of Copayment Escalations on Simvastatin Users: Multi-Year Longitudinal Assessment in the MarketScan Commercial Database

**Watanabe JH,* Sullivan SD. Western University of Health Sciences College of Pharmacy, 309 E. Second St., Pomona, CA 91766; jon.watanabe@outlook.com, 909.469.8778**

**BACKGROUND:** Copays for prescription medications are rising as health plans attempt to rein in mounting costs and to shunt drug utilization towards preferred agents. However, patients may respond to the increased price by reducing use of necessary medications.

**OBJECTIVE:** To estimate the reduction in adherence and medication supplied for patients that experience increases in average monthly copay over time for the chronic lipid management drug simvastatin. Outcome measures were the medication possession ratio (MPR) and days supplied per year.

**METHODS:** Age-, gender-, health plan type-, plan category-, geographic location-, comorbidity-, and year-adjusted regression analyses were obtained from the nationally representative MarketScan Commercial Claims Database for the years 2007 to 2010 using Generalized Estimating Equations (GEE) for correlated data. This database captures nearly 40 million covered lives in all geographic regions of the United States with claims from self-insured employers and health plans. Included subjects were U.S. adults ages 18 to 64 with continuous enrollment in a health plan for at least 2 years. Users of simvastatin with a minimum of 30 days supplied and at least 2 medication fills annually for a minimum of 2 consecutive years were included. Correlation structure for GEE models was evaluated using the Quasi-Likelihood

### TABLE

<table>
<thead>
<tr>
<th>Drug</th>
<th>$5 or More Increase in Monthly Copay</th>
<th>$10 or More Increase in Monthly Copay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change in MPR (95% CI)</td>
<td>Standard Error of Estimate</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>-0.024 (-0.026, -0.022)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

CI = confidence interval; MPR = medication possession ratio.
OBJECTIVE: was implemented to encourage cost-effective therapy through generic minocycline and doxycycline to generic alternatives. A medical policy no studies comparing efficacy and safety of branded orally administered for moderate to severe forms of acne vulgaris and acne rosacea. There are allowed per member per month (PMPM), amount allowed per claim, was compared with data 1 year prior. Measures evaluated were amount claim in 2010, a medical claim with an ICD-9-CM code for acne vulgaris Members were required to have a pharmacy claim for an oral antibiotic cal claims data for privately insured members in a midwestern state.

RESULTS: A total of 735,590 patients were included in the analysis in the years examined. The mean age in years ± standard deviation (SD) was 53.0 ± 7.3. The mean copayment per month ± SD for simvastatin was $5.92 ± 4.92. The mean MPR ± SD for simvastatin was 0.90 ± 0.17. The mean Quan score ± SD was 0.18 ± 0.47. Increase in $5 or more for average monthly copay was associated with a statistically significant change in MPR of -0.024 (95% CI, -0.026, -0.022). Assuming 365 days of use, this represents a reduction of 8.8 medication days supplied per year. Increase in $10 or more resulted in a change in MPR of -0.034 (95% CI, -0.038, -0.030) representing a reduction of 12.4 medication days supplied per year.

CONCLUSIONS: Copay increases are associated with significant reductions in adherence of the chronic lipid management medication simvastatin. Benefit managers should factor in the possible reduction in necessary consumption when proposing increases in copay structures.

SPONSORSHIP: This research was conducted by Western University of Health Sciences College of Pharmacy, Pomona, CA, without external funding.

Impact of Medical Policy Implementation for Branded Oral Acne Antibiotics on Prescription Utilization and Expenditures

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BACKGROUND: Oral doxycycline and minocycline are standard of care for moderate to severe forms of acne vulgaris and acne rosacea. There are no studies comparing efficacy and safety of branded orally administered minocycline and doxycycline to generic alternatives. A medical policy was implemented to encourage cost-effective therapy through generic utilization and reduction in associated expenditures.

OBJECTIVE: To evaluate the impact of a medical policy program for branded oral acne antibiotics on generic utilization rate (GUR), use of alternative therapy, and total cost of care.

METHODS: This is a retrospective analysis of pharmacy and medical claims data for privately insured members in a midwestern state. Members were required to have a pharmacy claim for an oral antibiotic claim in 2010, a medical claim with an ICD-9-CM code for acne vulgaris or rosacea, and continuous enrollment during the calendar years of 2010 (baseline) and 2011 (follow-up). Pharmacy claims for oral antibiotics that were less than a 28-day supply were excluded from the analysis. To assess the impact of the policy, data for 1 year post-implementation was compared with data 1 year prior. Measures evaluated were amount allowed per member per month (PMPM), amount allowed per claim, and GUR. The primary outcome was to assess differences in these measures with the utilization of oral tetracycline medications after the policy became effective. Secondary outcomes were associated differences in use of topical agents and oral retinoids. T-test was used to measure amount allowed PMPM and amount allowed per claim, and chi-square analyses were used to measure GUR.

RESULTS: There were significant decreases in amount allowed PMPM ($57.78 to $13.73; P < 0.001), amount allowed per claim ($202.50 to $46.30; P < 0.001), and a significant increase in GUR (69.3% to 96.8%; P < 0.001) for the oral antibiotic tetracyclines. For the total cost of care, there was a significant reduction in amount allowed PMPM ($53.22 to $31.95; P < 0.001) and amount allowed per claim ($164.00 to $96.90; P < 0.001). Overall, GUR increased from 59.5% to 73.6% (P < 0.001).

CONCLUSIONS: Since the implementation of the medical policy on the use of branded oral antibiotics in 2011, there was a significant increase in GUR and cost savings associated with less branded antibiotic use.

SPONSORSHIP: This research was conducted by BlueCross and BlueShield of Nebraska, Omaha, NE, without external funding.

Impact of Offering Voluntary and Mandatory Mail Pricing Options at a Retail Pharmacy Network for Employer Groups

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BACKGROUND: Utilization of mail service pharmacies continues to be an effective means to lower prescription costs for employers as well as improve adherence rates. In a 2011 survey, 60% of employers also utilized a plan design that offered 90-day supplies of maintenance medications at retail pharmacies in addition to mail service. For labor unions in particular, managing costs for prescription medications while also providing plan participants with increased choice and convenience is effective. By offering a coalition of union clients a continuum of retail pharmacy 90-day plan design options from voluntary to mandatory ultimately translates into reduced drug spend and flexibility for plan participants.

OBJECTIVE: To evaluate the impact on prescription costs and adherence rates by implementing voluntary or mandatory benefit designs where plan participants can receive 90-day prescriptions for maintenance medications.

METHODS: An observational pre- and post-implementation study using pharmacy claims data over 24 months from an integrated database. For the study, cost and adherence metrics were evaluated for a subset of a 300,000 life nationwide coalition trade union. Channel shifts and any associated financial savings were assessed among the groups that implemented either mandatory or voluntary 90-day plan designs at a retail pharmacy.

Table: Impact of Medical Policy Implementation for Branded Oral Acne Antibiotics

<table>
<thead>
<tr>
<th>Oral Acne Antibiotics</th>
<th>2010</th>
<th>2011</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount allowed/PMPM ($)</td>
<td>57.78</td>
<td>13.73</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Amount allowed/claim ($)</td>
<td>202.50</td>
<td>46.30</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>GUR (%)</td>
<td>69.30</td>
<td>96.80</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topical Agents</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount allowed/PMPM ($)</td>
<td>25.73</td>
<td>31.03</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Amount allowed/claim ($)</td>
<td>127.40</td>
<td>140.80</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>GUR (%)</td>
<td>50.20</td>
<td>53.50</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oral Retinoids</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount allowed/PMPM ($)</td>
<td>190.42</td>
<td>177.63</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Amount allowed/claim ($)</td>
<td>623.50</td>
<td>627.40</td>
<td>0.282</td>
</tr>
<tr>
<td>GUR (%)</td>
<td>99.83</td>
<td>100.00</td>
<td>0.305</td>
</tr>
</tbody>
</table>

Total Acne Medication (Oral and Topical)

| Amount allowed/PMPM ($) | 53.22  | 31.95  | < 0.001 |
| Amount allowed/claim ($) | 164.00 | 96.90  | < 0.001 |
| GUR (%)                 | 59.50  | 73.60  | < 0.001 |

GUR = generic utilization rate; PMPM = per member per month.
RESULTS: Results indicated gross savings of approximately 1% to 3% with 20%-25% of maintenance 30-day prescriptions moving to 90-day for those clients with a mandatory 90-day plan design with a retail component. Savings of less than 1% were expected with 10%-15% of maintenance 30-day prescriptions moving to 90-day for those clients with a voluntary 90-day plan design with a retail component. Medication possession ratio (MPR) improved comparing pre- and post-periods, which supports prior literature that 90-day prescriptions and interactions with retail pharmacists improve overall adherence rates.

CONCLUSIONS: Managing prescription drug costs as well as improving medication adherence continues to be very important for employers, particularly union groups that are sensitive to high costs and significant member disruption. By offering employers options in implementing a less restrictive voluntary 90-day plan design that allows for member outreach to a more restrictive mandatory 90-day plan design, this results in prescription cost savings, improved adherence rates, and flexibility for clients sensitive to member disruption.

SPONSORSHIP: This research was conducted by CVS Caremark, Northbrook, IL, without external funding.

Impact of Polypharmacy on Health Care Utilization Among the Elderly Population: Evidence from National Data from 2005-2008
Agbor-Bawa W,* Rianon N, Lafferty W, Rasa RS. University of Missouri-Kansas City School of Pharmacy, 2464 Charlotte St., Kansas City, MO 64108; wabi3@mail.umkc.edu, 816.235.5498

BACKGROUND: The elderly population is increasing with higher prevalence of multiple diseases that must be managed concurrently. Polypharmacy is also prevalent in the elderly population, as health providers seek to manage these diseases with multiple medications. It is also recognized that polypharmacy increases risk of adverse effects, drug/drug interactions, and drug/disease interactions and could have huge economic implication in the form of hospital visits and health care expenditures.

OBJECTIVE: To evaluate the impact of polypharmacy on national health care utilization in patients aged ≥65.

METHODS: This study used the Medical Expenditure Panel Survey (MEPS), a nationally representative panel survey, which provided data from 2005-2008. Polypharmacy was defined as 5 or more medications. Health care utilization variables (physician office visits, emergency room (ER) visits, and expenditures) were analyzed separately in evaluating their relationship to polypharmacy. Visits were modeled using a weighted negative binomial regression, while expenditures were modeled using generalized regression model. All models were adjusted for patient demographic and socioeconomic factors. National estimates for patients were estimated using weights provided by MEPS. The weighted multivariate logistic model was used to determine factors affecting multiple medication use.

RESULTS: A sample of 4,629 records represented a total of 99,126,153 weighted individuals (mean age, 74.7, SE=±0.138). The southern region represented 37.3%, women 58.1%, Caucasians 87.3%, and 56.8% were married. Approximately 69.4% of patients were on 5 or more medications with the most prevalent disease being hypertension (62.7%). Polypharmacy patients had a significantly greater number of mean differences in physician office visits 3.69 (SE=±0.09), ER visits 0.103 (SE=±0.0001), office-based total expenditures $725 (SD=± 129), and total prescription expenditures $500 (SD=±323) annually compared with patients on <5 medications. A logistic model reported females were 1.25 (OR=1.25); CI: 1.04-1.49) times more likely to be affected by polypharmacy, and patients with hypertension are 3.30 (OR=3.30; CI: 2.78-3.92) times more likely to experience polypharmacy.

CONCLUSIONS: This study identifies that polypharmacy affects health care utilization among elderly patients. Polypharmacy patients incur increased physician and ER visits and spend more on medications. Medication management with a focus on reducing polypharmacy for elderly patients could simplify drug regimens and potentially reduce harm.

Impact of Refill and Save Program on Adherence to Desvenlafaxine and Health Care Costs
Sadosky A,* Halpern R, Buikema A, Hultberg E, Alvir JF, Odell K, Whiteley J, Shah S. Pfizer Inc., 235 E. 42nd St., New York, NY 10017; alesia.sadosky@pfizer.com, 212.733.9491

BACKGROUND: Major depressive disorder (MDD) is characterized by consistent depressed mood, fatigue, lack of interest in activities, insomnia or hypersomnia, and other symptoms that negatively affect quality of life and productivity. The annual and lifetime prevalence rates of MDD in the United States are 7% and 17%, respectively. Desvenlafaxine (DSV), a serotonin-norepinephrine reuptake inhibitor, is 1 of multiple antidepressants indicated for MDD. Good adherence to antidepressants has been shown to be associated with better outcomes; yet, adherence to antidepressants in general is poor. A large U.S. health plan began a “Refill and Save Program” (RSP) in October 2009 to promote better adherence. The RSP linked a copayment discount directly to adherence by reducing the health plan member copayment (discount = $20 retail, $50 mail order) for DSV prescriptions when refilled within 30 days of the end of a previous antidepressant fill.

OBJECTIVE: To understand the effect of RSP copayment discounts for DSV on medication adherence and health care costs by comparing health plan members with and without RSP benefits.

METHODS: This retrospective claims database analysis examined commercially insured members aged 18 years old or older. The index date, set during the first 6 months of the RSP (October 2009-March 2010), was the first DSV fill with RSP benefit for the RSP cohort, and the first DSV fill for the non-RSP cohort. Members were continuously enrolled for 6 months pre-index (baseline) and 9 months post-index (follow-up). Outcomes measured during follow-up were proportion of days covered (PDC) with DSV and total health care costs (health plan and patient paid costs for all medical services and outpatient prescription medications). The relationship between RSP and PDC was modeled using ordinary least-squares regression; costs were modeled using gamma regression with a log link. Models were adjusted for cohort, pre-index antidepressant use (PDC on antidepressants, naive vs. current DSV users, naive antidepressant use), index month, plan characteristics (high deductible, full coverage, and low cost formulary), and demographics.

RESULTS: A total 11,820 members met the criteria: n = 7,463 (63.1%) RSP and n = 4,357 (36.9%) non-RSP. The mean (SD) age in each cohort was 45 (12) years (P=0.330); 74.3% and 77.9% of the RSP and non-RSP cohorts, respectively, were female (P=0.330). Unadjusted mean (SD) total health care costs were $8,406 ($14,163) and $9,176 ($22,832) in the RSP and non-RSP cohorts, respectively (P=0.044). After adjusting for covariates, PDC was 7.4 percentage points higher (95% CI=6.1-8.6; P<0.001) and total health care costs were 10.2% lower (cost ratio=0.898, 95% CI=0.831-0.971; P=0.007) in the RSP (vs. non-RSP) cohort.
CONCLUSIONS: The RSP cohort had significantly higher PDC and lower total health care costs compared with the non-RSP cohort. Study limitations included inability to observe actual medication-taking behavior or to control for unobserved factors such as income or severity of depression that could affect PDC or costs. Copayment discounts may have a positive impact on adherence to antidepressants and be associated with lower health care costs.

SPONSORSHIP: This research was funded by Pfizer Inc., New York, NY.

Impact of the Affordable Care Act (Health Care Reform) Provisions for Preventive Care Coverage on Pharmaceutical Costs and Utilization

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BACKGROUND: Preventive health care is intended to keep people healthy, avoid or delay onset of disease, help people lead productive lives, and reduce overall health care costs. According to the Affordable Care Act, nongrandfathered plans must provide certain preventive services without member cost sharing when delivered by an in-network provider. For plan years that begin on or after September 23, 2010, the U.S. Preventive Services Task Force recommendations include the use of aspirin, fluorides, folic acid, iron, and tobacco cessation products for preventive health care. With these mandates, pharmaceutical costs and utilization are expected to increase, while overall health care costs and utilization are expected to decrease in the future. While it is too soon to evaluate overall health care costs and utilization, we are now beginning to see the impact of preventive care coverage on pharmaceutical costs and utilization.

OBJECTIVE: To evaluate the effect of health care reform provisions regarding preventive care coverage on pharmaceutical costs and utilization.

METHODS: A retrospective observational study design using pre- and post-implementation data from an integrated database of administrative pharmacy claims was used to evaluate the impact of health care reform provisions around preventive care on pharmaceutical costs and utilization. The analysis was performed on the membership of nongrandfathered employer plans composed of 1.4 million members. For the clients in this observational study, these health care reform provisions were implemented in 2011. Pharmaceutical costs and utilization were analyzed for aspirin, fluorides, folic acid, iron, and tobacco cessation products (preventive drugs). The metrics used to measure cost and utilization changes included utilizers of preventive drugs as a percentage of average members, preventive drug gross cost per member per year (PMPY), preventive drug plan cost PMPY, preventive drug days supply PMPY, and preventive drug plan cost as a percentage of total drug plan cost.

RESULTS: Comparison was done between the pre-implementation period of 2010 versus the post-implementation period of 2011. Of the membership, 1.2% utilized a preventive drug in 2011, an increase of 90.2%. Preventive drug gross cost PMPY increased 43.8% to $1.69. Preventive drug plan cost PMPY increased 120.6% to $1.69, which represented less than 0.2% of total drug plan cost. Preventive drug days supply PMPY increased 146.3% to 1.06.

CONCLUSIONS: The study outcomes provide preliminary insight on the impact of health care reform provisions for preventive care coverage of aspirin, fluorides, folic acid, iron, and tobacco cessation products without member cost share on pharmaceutical costs and utilization.

SPONSORSHIP: This research was conducted by CVS Caremark, Northbrook, IL, without external funding.

Improving the Participation Rate for Comprehensive Medication Reviews Through Enhancing Part D Beneficiaries’ Understanding of the Service

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BACKGROUND: The Centers for Medicare and Medicaid Services (CMS) requires Part D sponsors to offer a comprehensive medication review (CMR) annually to eligible Part D beneficiaries through the plans’ Medication Therapy Management Program (MTMP). In 2011, the Pharmacy Quality Alliance endorsed “the completion rate for comprehensive medication review” as a quality measure for MTMPs, and it is expected that CMS will adopt this measure into the plan-rating system in 2014 to promote delivery of the service for patients at risk for medication-related problems.

OBJECTIVE: To demonstrate the effectiveness in increasing CMR participation rate of a standardized script that emphasized benefits and potential barriers of receiving a CMR.

METHODS: A new CMR recruitment script, shaped by the Health Belief Model, was developed based on a previous pilot study. This newly developed script aimed to enhance beneficiaries’ understanding of the CMR service, explain the benefits of the service from the beneficiaries’ perspective, and address potential barriers that beneficiaries might have in accepting the service. The new script was tested in the first quarter of the MTMP enrollment in 2012 using a randomized controlled experiment with the original script as the control. The original script, which was used for CMR recruitment in the previous year, described the service but did not emphasize key benefits or barriers from the beneficiaries’ perspective. The CMR service was offered to the MTMP members using the scripts via phone calls by live call agents. Two call attempts were made to reach the person, and if the person could not be reached after 2 attempts, a computer-generated voicemail message was left, and a letter regarding the MTMP and CMR was subsequently mailed.

RESULTS: There were 105,701 beneficiaries in the first quarter of the MTMP enrollment. Approximately 10% responded to the calls and listened to the scripts. Members who responded to calls were on average 68.9 years old, taking 10 to 11 chronic medications, and with 6 different disease conditions. Among members who responded to the calls, 52.9% were exposed to the original script and 47.1% to the new script. For the new script, 48.2% of the members accepted the offer to schedule a CMR, whereas 38.1% of members exposed to the original script accepted the service. Multivariate logistic regression was employed to examine factors that may influence the member’s decision on the CMR offer. Members who received the new script were 1.578 (95% CI = 1.45-1.72) times more likely to accept the CMR offer compared with those who received the original script. Among other factors, number of chronic medications (odds ratio [OR] = 1.038, 95% CI = 1.020-1.057), number of disease conditions (OR = 1.039, 95% CI = 1.014-1.064), and member’s previous involvement in the MTMP were positively associated with acceptance of CMR offer.

CONCLUSIONS: The new script outperformed the original script in promoting members’ acceptance to the CMR; yet, there continues to be room for improvement. The new script will be further improved based on the results from 2012, and the improved script is planned to be tested in 2013. Further, findings suggest that efforts should also be directed at members who do not respond to phone calls or mail offers to participate in CMR service.

SPONSORSHIP: This research was funded by Elsevier/Gold Standard, Tampa, FL.
Investigating the Association Between Copayment Status and Adherence for Statin Medications in a Veterans Administration Population

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BACKGROUND: Copayment pricing has been shown to influence medication consumption behavior. Prior to 2010, patients paid a flat copayment of $8 per 30-day supply in the Department of Veterans Affairs (VA). However, some veterans during this period were exempt from copayments depending on a multitude of factors determining benefits.

OBJECTIVE: To evaluate the association between copayment status and adherence to statin therapy.

METHODS: A retrospective cohort study using data from the VA was performed to test the study objective. Data were extracted from the Veterans Integrated System Network 22, a region that includes sites at California (Los Angeles, Long Beach, San Diego, and Loma Linda) and Veterans Administration Population Status and Adherence for Statin Medications in a

RESULTS: Patients in the NSC group were older (65.5 years) compared with patients in the SC (62.6 years) and NC (61.2 years) groups (P < 0.001). Patients who did not pay a copayment had more medications than the SC reference group (N = 122) and NSC (n = 55) groups (P < 0.001). For the main outcome, patients without a statin copayment were associated with a 0.02 increase in MPR (< 0.001). Patients who did not pay a copayment had more medications compared with the SC reference group. Findings revealed a nonsignificant increase in MPR with patients who had a copayment but were not service connected. Findings may differ in non-VA populations.

SPONSORSHIP: This research was conducted by Western University of Health Sciences College of Pharmacy, Pomona, CA, without external funding.

Lack of Overall Dose Escalation Between 2007 and 2012 with Etanercept (Enbrel) and Adalimumab (Humira)

Gunderson B, Johnson S, Gleason PP,* Starner CI. Prime Therapeutics LLC, 1305 Corporate Center Dr., Eagan, MN 55121; pgleason@primetherapeutics.com, 800.858.0723

BACKGROUND: Etanercept (Enbrel) and adalimumab (Humira) are tumor necrosis factor (TNF) blockers indicated for a variety of inflammatory autoimmune conditions (e.g., rheumatoid arthritis). In 2011, among Prime’s commercially insured customers, adalimumab and etanercept were the top 1 and 3 drugs by percentage of spend, respectively. Adalimumab 2011 per member per month (PMPM) was $1.50 (2.3% of overall) and etanercept PMPM was $1.43 (2.2% of overall). Drug costs in the autoimmune category have continued to rise over the past 5 years, and there is some literature to suggest adalimumab dose increases beyond labeling may be occurring.

OBJECTIVE: To assess dose and cost patterns of etanercept and adalimumab to identify potential opportunities for enhanced management.

METHODS: Pharmacy claims data from 9 million commercially insured members with Prime Therapeutics pharmacy benefit coverage were queried. All paid claims for etanercept and adalimumab were captured from January 1, 2007, through June 30, 2012. To evaluate dose changes between the 2 products, the average mg per day for all claims in the quarter was calculated starting on January 1, 2007. To permit comparisons between etanercept and adalimumab, which have different daily dosing guidelines, each drug’s average dose per day starting in Q1 2007 was normalized to 1. The subsequent average quarterly values of daily dose were compared with the standardized value from Q1 2007. Average quarterly gross cost per day for each product was calculated.

RESULTS: Patients in the NSC group were older (65.5 years) compared with patients in the SC (62.6 years) and NC (61.2 years) groups (P < 0.001). Patients who did not pay a copayment had more medications than the SC reference group (N = 122) and NSC (n = 55) groups (P < 0.001). There were more females in the NC group (n = 158) compared with the SC (N = 122) and NSC (n = 55) groups (P < 0.001). For the main outcome, patients without a statin copayment were associated with a 0.03 increase in MPR (P = 0.01) versus the SC reference group. Patients with a copayment that was NSC were associated with a 0.02 increase in MPR (P = 0.10) versus the SC reference group.

CONCLUSIONS: In this analysis, we found an improvement in adherence to statin medications for those that did not have a copayment.

Additionally, our results revealed a nonsignificant increase in MPR with patients who had a copayment but were not service connected. Findings may differ in non-VA populations.

TABLE

<table>
<thead>
<tr>
<th>Copayment Category</th>
<th>Increase in MPR</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copayment (service connected)</td>
<td>Reference</td>
<td>N/A</td>
</tr>
<tr>
<td>Zero copayment</td>
<td>0.03</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Copayment (nonservice connected)</td>
<td>0.01</td>
<td>0.10</td>
</tr>
</tbody>
</table>

FIGURE 1

Relative Change in Average Quarterly Milligrams Per Day for Etanercept and Adalimumab Among 9 Million Commerical Insured Members
using total paid amounts on the pharmacy claim (health plan and member share). The compound annual growth rate (CAGR) was used to describe all trends from 2007 through 2012.

RESULTS: The average mg per day for etanercept in Q1 2007 was 8.068 and for adalimumab 3.479. Over 4.5 years, the average mg per day for each product slightly decreased to an average of 7.541 for etanercept and 3.256 for adalimumab in Q2 2012. The change in average mg per day between Q1 2007 and Q2 2012 was -13.6% and -3.0% for etanercept and adalimumab, respectively (Figure 1). Average daily gross costs for etanercept starting in Q1 2007 were $54.96 and increased to $76.00 in 2012, a 38.3% increase. Average daily gross costs for adalimumab increased 38.4% in Q1 2007 ($57.98) to $80.24 in Q2 2012. Since 2007, the wholesale acquisition cost (WAC) of etanercept has had a CAGR of 8.0%. Changes in WAC between 2011 and 2012 were more than 12.0%. Since 2007, adalimumab had seen similar WAC price increases with a CAGR of 7.8% and double digit price increases in 2011 (13.2%) and 2012 (11.1%; Figure 2).

CONCLUSIONS: The current findings do not support dose increases in the TNF blockers since 2007. In fact, it appears that on a mg per day basis, doses may actually be decreasing. WAC prices for etanercept and adalimumab have been steadily increasing and seem to be rising at a faster rate in more recent time periods. Increasing daily costs for each of these drugs has been primarily driven by manufacturer price increases.

SPONSORSHIP: This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

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**FIGURE 2** Average Wholesale Acquisition Cost for Etanercept and Adalimumab

mg/mL = milligram per milliter.

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**TABLE** Top 15 Coupon Drug Classes, July 2012: Sorted by Coupons as a Percentage of Member Spend by Class

<table>
<thead>
<tr>
<th>(All $ Values in 000’s)</th>
<th>Potential Coupon Rank</th>
<th>Total Spend ($)</th>
<th>Member Spend ($)</th>
<th>Member as % Total</th>
<th>Potential Coupons ($)</th>
<th>Coupons as % Total</th>
<th>A</th>
<th>Potential Generic Saving ($)</th>
<th>Potential Generic/Brand Cost/Day (%)</th>
<th>Average Age (GPI2) Drug Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychotherapeutic and neurological agents, misc.</td>
<td>7</td>
<td>320</td>
<td>35</td>
<td>10.9</td>
<td>59</td>
<td>18.5</td>
<td>169.4</td>
<td>174</td>
<td>45.5</td>
<td>1</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>3</td>
<td>124</td>
<td>49</td>
<td>39.4</td>
<td>76</td>
<td>61.1</td>
<td>155.0</td>
<td>103</td>
<td>16.6</td>
<td>4</td>
</tr>
<tr>
<td>Hematological agents, misc.</td>
<td>4</td>
<td>163</td>
<td>49</td>
<td>30.0</td>
<td>73</td>
<td>45.2</td>
<td>150.7</td>
<td>98</td>
<td>39.5</td>
<td>1</td>
</tr>
<tr>
<td>Analgesics, anti-inflammatory</td>
<td>1</td>
<td>510</td>
<td>105</td>
<td>20.5</td>
<td>149</td>
<td>29.2</td>
<td>142.4</td>
<td>481</td>
<td>5.8</td>
<td>1</td>
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<tr>
<td>Analgesics, opioid</td>
<td>15</td>
<td>114</td>
<td>20</td>
<td>17.2</td>
<td>22</td>
<td>19.2</td>
<td>111.8</td>
<td>107</td>
<td>6.3</td>
<td>1</td>
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<tr>
<td>Dermatologicals</td>
<td>5</td>
<td>154</td>
<td>68</td>
<td>44.3</td>
<td>69</td>
<td>45.0</td>
<td>101.7</td>
<td>127</td>
<td>17.5</td>
<td>1</td>
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<tr>
<td>Anticonvulsants</td>
<td>14</td>
<td>142</td>
<td>35</td>
<td>24.9</td>
<td>24</td>
<td>16.8</td>
<td>67.4</td>
<td>125</td>
<td>11.8</td>
<td>2*</td>
</tr>
<tr>
<td>Ulcer drugs</td>
<td>8</td>
<td>299</td>
<td>86</td>
<td>28.6</td>
<td>50</td>
<td>16.6</td>
<td>57.8</td>
<td>256</td>
<td>14.7</td>
<td>1</td>
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<tr>
<td>ADHD/antinarcopolysy/antihyperlipidemias</td>
<td>11</td>
<td>128</td>
<td>66</td>
<td>51.9</td>
<td>38</td>
<td>29.7</td>
<td>57.2</td>
<td>105</td>
<td>18.0</td>
<td>3</td>
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<tr>
<td>Cardiovascular agents, misc.</td>
<td>13</td>
<td>73</td>
<td>48</td>
<td>65.3</td>
<td>24</td>
<td>33.4</td>
<td>51.1</td>
<td>23</td>
<td>68.2</td>
<td>4</td>
</tr>
<tr>
<td>Antihyperlipidemias</td>
<td>2</td>
<td>603</td>
<td>272</td>
<td>45.1</td>
<td>132</td>
<td>21.8</td>
<td>48.3</td>
<td>400</td>
<td>33.6</td>
<td>1</td>
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<tr>
<td>Antivirals</td>
<td>10</td>
<td>431</td>
<td>86</td>
<td>19.9</td>
<td>40</td>
<td>9.2</td>
<td>46.1</td>
<td>399</td>
<td>7.5</td>
<td>1</td>
</tr>
<tr>
<td>Antidiabetics</td>
<td>6</td>
<td>499</td>
<td>190</td>
<td>38.0</td>
<td>64</td>
<td>12.8</td>
<td>33.7</td>
<td>490</td>
<td>1.7</td>
<td>1</td>
</tr>
<tr>
<td>Antiasthmatic and chronic bronchodilator agents</td>
<td>12</td>
<td>348</td>
<td>103</td>
<td>29.7</td>
<td>33</td>
<td>9.5</td>
<td>31.9</td>
<td>0</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>Antihypertensives</td>
<td>9</td>
<td>277</td>
<td>135</td>
<td>48.7</td>
<td>43</td>
<td>15.4</td>
<td>31.6</td>
<td>226</td>
<td>18.4</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>4,185</td>
<td>1,346</td>
<td>32.2</td>
<td>895</td>
<td>21.4</td>
<td>66.5</td>
<td>3,115</td>
<td>25.6</td>
<td>51</td>
<td></td>
</tr>
</tbody>
</table>

Top 15 as % eExh. 2 total brand: 38.6% 39.3% Coupon $: 75.7% as % Total Cost: 21.1%©2013 Caremark. All rights reserved.

Note: Drugs can be paid for in cash, then paper claims submitted, and amounts above the copay recovered allowing a profit per script. In these 15 classes, generics cost 25.6% of brand drugs.

aCoupon type: 1 = Flat $ (since July 2012 this type has quickly evolved to “flat $ to a max of actual outlay); 2* = Member pays up to a coupon copay, then manufacturer pays 100% up to a set limit; 3 = % Rebate; 4 = Free Trial.
BACKGROUND: Brand manufacturer coupons grew 264% in 2011; $10,000 per member per year limits are common. The weak economy, increases in generics and over the counters, new electronic marketing venues, and brand manufacturer’s legal mandate to fill the Medicare Part D donut hole add all to the urgency of a significant coupon strategy. Coupons allow brand cost increases to be passed to private plan payers rather than members and, in so doing, weaken pharmacy benefit management (PBM) plan designs used to incent adherence, lower cost drugs, and delivery channels.

OBJECTIVE: To clarify and quantify private PBM payer and member stakes given brand drug manufacturers’ coupon strategies.

METHODS: This research measures the percentage of brands offering coupons, their potential dollar value as a percentage of total and members’ brand costs, and generic alternative costs for 2 PBM clients. Client 1 has 2 coverages: a health reimbursement account (HRA) with 60% average member share and a 35% share plan. Client 2’s plan has 10% member share. Online brand coupon sites were checked in September 2012. Reliable information was matched against the claims from the 2 clients.

RESULTS: Brand coupon potential was 10.9% of total plan and 34.6% of brand member spend. Coupons were available in 52 (under 1%) drug classes, comprising 47.6% of cost. The average age of utilizes of drug classes offering coupons was 53 years versus the 37-year all-utilizer average. For low member share plans, brand member costs can be negative (coupons can exceed copays). At 100% coupon redemption, average member retail brand costs would be less than mail for all 3 plans. For top coupon classes, coupons were 50%-67% of total cost and exceeded member cost for all 3 plans.

CONCLUSIONS: Because expected drug use and age are directly correlated, and coupons are targeted at classes used by higher-aged patients, private payers with high average ages will absorb the largest shift from the coupon strategy. Most coupon returns are maximized with shorter fills, directly countering generic and 90-day fill, cost, and adherence goals. Nonadherence causes 10% of hospitalizations and 75% of readmissions. Coupons are increasingly requiring otherwise confidential member info coveted for direct marketing. Coupon offers exceed member share for low member share plans, incenting perverse over- and misutilization. Comprehensive UM programs, including mandatory generics and mail, targeted member and doctor communication regarding coupons, plan design, health, and cost, are vital to curbing costs and increasing adherence.

SPONSORSHIP: This research was conducted by CVS Caremark, Northbrook, IL, without external funding.

Medicaid Pharmacy Benefit Carve-Ins and Their Impact on Generic Dispensing Rates and Program Costs

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BACKGROUND: Several state-run Medicaid programs are turning to traditional managed care organizations (MCOs) to manage their pharmacy benefit programs after previously carving out their pharmacy benefits to state-run fee-for-service programs. Pharmacy carve-in arrangements managed by MCOs are often associated with more complete monitoring of members’ prescription drugs, where high utilizers, inappropriate usage, and candidates for disease and case management can be identified, thus, effectively addressing the “total person” from a clinical and cost perspective. Previous research conducted by CVS Caremark showed a decrease in generic dispensing rates (GDR) and an increase in program costs associated with the movement to a carve-out arrangement. Recent legislative changes promoting carve-in arrangements gave us the opportunity to provide updated research that investigates what happens when a state moves in the opposite direction, from a carve-out to a carve-in arrangement. Preliminary findings from this updated research reaffirm the notion that traditional pharmacy benefit programs managed by an MCO lead to improved utilization and cost outcomes. Specifically, these recent CVS Caremark data show a significant increase in GDR and decrease in costs for state-run Medicaid programs that returned to a carve-in pharmacy benefit arrangement offered by traditional MCOs.

OBJECTIVE: To evaluate the impact on GDR and costs on previously state-run Medicaid programs after their pharmacy benefits were carved-in to a traditional MCO.

METHODS: This is a retrospective observational study design using claims post-implementation from an integrated database of administrative pharmacy claims to measure the impact on lower cost generic drug utilization when a state moves to a carve-in program. GDR and cost impacts were evaluated from data that included generic drug launches for a 12-month time period. Results are based on findings from several large Medicaid health plans previously operating state-run fee-for-service programs. T-test and/or ANOVA analyses were performed to determine the statistical significance of the results.

**FIGURE** GDR and Gross Cost Per Member Per Month: All Drugs Versus All Drugs Excluding Generics

<table>
<thead>
<tr>
<th>Medicaid Clients</th>
<th>October 2011</th>
<th>August 2012</th>
<th>Difference/Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Cost PMPM ($)</td>
<td>GDR (%)</td>
<td>Gross Cost PMPM ($)</td>
<td>GDR (%)</td>
</tr>
<tr>
<td>All drugs</td>
<td>70.4</td>
<td>79.70</td>
<td>82.6</td>
</tr>
<tr>
<td>All drugs excluding generic drug launches</td>
<td>72.2</td>
<td>71.65</td>
<td>82.3</td>
</tr>
</tbody>
</table>

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GDR = generic dispensing rates; PMPM = per patient per month.
RESULTS: GDR increased an average of 12%, and gross drug costs per member per month decreased 18% over the initial 11-month time period following implementation of the carve-in program for several Medicaid plans. Furthermore, controlling for generic drug launches yielded approximately a 10% increase in GDR and a 13% decrease in gross drug costs per member per month.

CONCLUSIONS: The findings from this study indicate that a pharmacy benefit design that encourages use of generic medications leads to an increase in GDR and thus a decrease in costs, even while controlling for generic drug launches. Carve-in approaches appear to be associated with positive utilization management and cost benefit. They allow for improved care coordination, since pharmacy and other medical benefits are managed under a single entity.

SPONSORSHIP: This research was conducted by CVS Caremark, Northbrook, IL, without external funding.

 Medical Costs Associated with Treatment Failure with Over-the-Counter or Prescription Constipation Treatments in Patients with IBS-C in a Medicaid Population

Guerin A, Carson RT,* Kaminsky M, Taylor D, Sarocco P, Wu EQ. Forest Research Institute, Inc., Harborside Financial Center, Plaza V, Ste. 1900, Jersey City, NJ 07311; robyn.carson@fri.com, 201-427-8911

BACKGROUND: Pharmacologic treatments for irritable bowel syndrome with constipation (IBS-C), a common chronic functional gastrointestinal disorder characterized by recurrent symptoms of abdominal pain and/or discomfort and altered bowel function, include over-the-counter (OTC) laxatives, bulking agents, and stool softeners and prescription (Rx) medications.

OBJECTIVE: To estimate the incremental medical costs associated with indicators of treatment failure with OTC or Rx constipation treatments in IBS-C patients in a Medicaid population.

METHODS: This was a retrospective cohort study using de-identified medical and pharmacy claims from the Missouri Medicaid program (1997-2010) to assess health care resource utilization (HRU) and costs in IBS-C patients with versus without indicators of treatment failure while receiving constipation medications. Inclusion criteria were adult patients (age ≥18 years) who had ≥1 claim with a diagnosis of IBS (ICD-9-CM code 564.1x), ≥2 constipation-diagnosis claims (ICD-9-CM code 564.0x), and ≥1 constipation-treatment claim in ≤1 year of an IBS diagnosis. Exclusion criteria included having a diarrhea-diagnosis claim (ICD-9-CM code 564.5x) or antidiarrheal claim during the 6-month period before the index date, which was defined as the date of the first constipation-treatment claim initiated in ≤1 year of an IBS diagnosis. Patients were categorized into 2 subgroups based on the type of index treatment: OTC or Rx. In the subgroups, indicators of treatment failure, HRU, and costs were observed during the 1-year period following the index date. Indicators of treatment failure were defined as switch or addition of new constipation therapy; IBS- or constipation-related inpatient or emergency room admission; megacolon diagnosis; a constipation-related medical procedure; or use of colchicine, misoprostol, or rifaximin. HRU was defined as any claim for service and measured using incidence rate ratios (IRRs). Incremental HRU and health care costs (USD 2010; adjusted to USD 2011 values using the Consumer Price Index inflation rate), which were measured from a public payer perspective, were compared between study cohorts using multivariate generalized linear regression models with a log link and a negative binomial distribution for HRU (results reported as IRRs) and a gamma distribution for health care costs (reported as cost differences). Unadjusted P values were calculated using Wilcoxon rank-sum tests.

RESULTS: This analysis included 1,723 and 1,203 IBS-C patients with index claims for OTC and Rx medication, respectively, 49.4% and 41.6% of these, respectively, experienced ≥1 indicators of treatment failure. Demographic characteristics were similar for patients with or without indicators of treatment failure. In both subgroups, indicators of treatment failure were associated with more HRU, such as the number of inpatient days (OTC subgroup, adjusted IRR = 1.72; Rx subgroup, adjusted IRR = 1.87; both P<0.001) and higher incremental medical costs (table).

CONCLUSIONS: Indicators of treatment failure with OTC or Rx constipation medications are associated with substantial incremental HRU and health care costs for IBS-C patients and payers.

SPONSORSHIP: This research was funded by Forest Laboratories, Inc., Jersey City, NJ, and Ironwood Pharmaceuticals, Inc., Cambridge, MA.

 Medication Reconciliation in Community Pharmacy

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BACKGROUND: Many hospitals have implemented medication reconciliation programs that consist of making the most accurate medication file for the patient. However, even with these programs the patients’ medication files continue to differ from the community pharmacy records. Theoretically, the implementation of community pharmacy...

<table>
<thead>
<tr>
<th>TABLE</th>
<th>Medical Costs</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>OTC Index Claim*</td>
</tr>
<tr>
<td>Cost Type</td>
<td>Patients with ≥1 Indicator of Treatment Failure (n = 851)</td>
</tr>
<tr>
<td>Hospital admissions</td>
<td>2,383.88 (6,472.46)</td>
</tr>
<tr>
<td>Outpatient visits</td>
<td>3,501.11 (4,041.16)</td>
</tr>
<tr>
<td>Emergency room visits</td>
<td>1,009.00 (2,463.24)</td>
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<tr>
<td>Total mean medical costs</td>
<td>6,893.99</td>
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</tbody>
</table>

Note: Costs are reported as mean (standard deviation) in 2011 dollars unless otherwise defined.
*Patients with index claims for OTC and Rx treatments were included in both subgroups.
*P<0.004 versus patients without indicators of treatment failure.
OTC = over the counter; Rx = prescription.
based programs could provide even greater patient safety than achieved with hospital programs. In addition, the community pharmacy-based medication reconciliation program can impact health care provision in various other settings such as nursing homes, primary care clinics, and assisted living. A collaborative team was formed between a pharmacy, a clinic, and an assisted living facility to explore the impact of a medication reconciliation program in a rural area.

OBJECTIVE: To measure the impact, satisfaction, and feasibility of a community pharmacy-based medication reconciliation program in a rural setting.

METHODS: The study was conducted in a rural community between June and August 2012. The program involved a community pharmacy, clinic, and assisted living facility. The program entailed the clinic or assisted living facility faxing the patient’s prescription list to the pharmacy; the pharmacist comparing the list to the pharmacy records (actual product procurement), and the pharmacist contacting the provider. A total of 59 patients’ medication regimens were examined (53 clinic patients, 6 assisted living facility patients). The feasibility and utility of the program was analyzed with an open-ended question survey given to the pharmacy staff and health care facilities involved.

RESULTS: A total of 101 discrepancies were found among 59 patients (mean 1.7, SD 1.6, range 0-7 discrepancies/patient). The majority of the discrepancies were found in clinic patients (93.1%, 94 discrepancies; 18 discrepancies/patient) with the remainder found in patients residing in the assisted living center (1 discrepancy/patient). Discrepancies comparing the provider profile to actual medication purchased included discontinued medications remaining on the provider profile (28%), current medications omitted from the provider record (25%), and wrong medication strength on the provider list (19%). Interventions resulted in updating medication profile (60%) and discontinuing medications (38%). A total of 17 people completed the feasibility and utility survey. The survey conducted following completion of the program found the average estimated time for the entire process was 5 minutes. Health care professionals involved in the study were extremely satisfied with the program and plan to continue using the process.

CONCLUSIONS: Medication reconciliation identified frequent inconsistencies that lead to medication discontinuation 40% of the time. Based on the amount of time required to complete the task, large impact, and high level of satisfaction, this program should be considered for use by community pharmacists.

SPONSORSHIP: This research was funded by Walmart-SDSU Summer Leader Fellowship Grant, Brookings, SD.

Methods to Detect Adverse Drug Reactions Using Automated Health Care Databases

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BACKGROUND: Automated health care databases, such as health insurance claims databases, are sometimes used to conduct active surveillance for adverse drug reactions and to investigate safety signals. Health insurance claims databases provide large sample sizes, which are essential to identify rare outcomes and to provide information on adverse drug reactions in real-world populations. Legislation introduced through the Food and Drug Administration Amendments Act of 2007 resulted in the development of a national system called the FDA Sentinel System to conduct surveillance for adverse drug reactions using automated health care databases. The initial phases of FDA’s Sentinel System have focused on methods to identify serious adverse drug reactions associated with medication use, including some of the designated medical events (DMEs), a list published by the FDA in 2003 of adverse outcomes correlated with medication use that have a high risk of severe morbidity or mortality. A frequently used method is to develop algorithms using ICD-9-CM diagnosis codes to search health insurance claims data for adverse drug reactions. The performance of these algorithms is measured by conducting patient chart reviews to confirm outcomes to establish the reliability of algorithm use alone.

OBJECTIVE: To identify and characterize methodological work completed to date on algorithms used to identify DMEs in health care databases and compile a library of adverse drug reaction search algorithms that could be used by managed care organizations in their own patient populations.

METHODS: A literature review was conducted using a subset of the FDA’s proposed DMEs. Included articles were published within the last 10 years, had data only from North American patients, and included MeSH subheadings for “epidemiology,” “drug effects,” or “chemically induced.” In addition, the websites for the FDA Mini Sentinel Pilot Program and the Observational Medical Outcomes Partnership (OMOP) website were investigated for additional studies.

RESULTS: Ten systematic reviews were found that investigated methods used to identify 10 of the 16 DMEs that we selected. These reviews covered the following DMEs: toxic epidermal necrolysis, seizure disorders, torsades de pointe, ventricular fibrillation, acute liver failure, acute kidney failure, anaphylaxis, lung fibrosis, aplastic anemia, and acute respiratory failure. Since a principle measure of validity for search algorithms is positive predictive value (PPV), we defined search algorithms with a PPV threshold of ≥70% as a plausible method for researchers to use in conducting active surveillance or signal investigation of a specific DME. DMEs with search algorithms with PPVs <70% were deemed areas of opportunity for further research. For the 10 DMEs found, only 3 had algorithms identified that met the PPV threshold of ≥70%; the remaining 7 had algorithms with PPVs ranging from 0%-51%. Limitations of this study included the restriction of our search to PubMed, the FDA Mini Sentinel website, and the OMOP website, which may have excluded published work.

CONCLUSIONS: Opportunity exists for further algorithm development in low performance and understudied DMEs. Algorithms that exceed 70% PPV for DMEs may provide an opportunity for managed care-based researchers to reliably identify and characterize adverse drug reactions in their respective patient populations with the ultimate goal to improve patient outcomes.

SPONSORSHIP: This research was conducted by University of Florida College of Pharmacy, Gainesville, FL, and Xcenda, Palm Harbor, FL, without external funding.

Obtaining Information on Diagnostic Tests from Industry

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BACKGROUND: As more targeted drugs receive FDA approval, there is a focus on finding biomarkers that will indicate safety and efficacy for individual patients. Mirroring this focus is an emphasis on developing reliable and accurate companion diagnostics to detect biomarker status. To highlight the importance of this, the Academy of Managed Care Pharmacy (AMCP) released a draft addendum to the Format for Formulary Submissions on August 20, 2012, to detail the evidentiary standards such as analytic validity, clinical utility, and clinical validity of companion diagnostic tests that should be included in corresponding drug dossiers. Payers and health care institutions need diagnostic test
information to make formulary decisions regarding the correspond-
ing therapeutic products. This survey assesses the current landscape
in acquiring information about diagnostics from drug and diagnostic
manufacturers.

**OBJECTIVE:** To characterize how drug and diagnostic manufacturers respond to unsolicited information requests about FDA approved, commercially available diagnostic tests.

**METHODS:** Five oncology biomarkers were selected for this study: ALK, BRAF V600E, EGFR, HER2, and KRAS. Information on the FDA-approved tests, the drugs, and their manufacturers were collected. Various resources, including the Summary of Safety and Efficacy Data (SSED), product websites, and drug labels, were used. Each drug and diagnostic manufacturer was called via telephone from the perspective of a clinical pharmacist requesting information about a particular diagnostic test to assist in formulary decision making about the corresponding drug. Specifically, information about the test's analytical validity, clinical validity, and clinical utility was asked.

**RESULTS:** A total of 20 calls were made to manufacturers (7 diagnostic and 13 drug manufacturers). 38% of requests to drug manufacturers resulted in a medical letter containing little or no information requested about the diagnostic test, while 23% of requests resulted in a referral to the diagnostic test manufacturer. An additional 23% resulted in both outcomes, with the remaining 15% of requests resulting in referrals to company websites. On the other hand, 71% of calls to diagnostic manufacturers resulted in referrals to company websites where package inserts for tests were found 60% of the time. Only 14% of information requests from diagnostic manufacturers resulted in the provision of the package insert for the test.

**CONCLUSIONS:** While diagnostic manufacturers responded via technical service departments staffed mainly by nonhealth care professionals, drug manufacturers responded via medical information departments staffed by health care professionals. Astonishingly, only 25% of calls resulted in access to some or most of the information requested about diagnostic tests. This study shows that limitations exist in obtaining information about FDA-approved diagnostic tests from diagnostic and drug manufacturers. It may be interesting to evaluate the provision of diagnostic test information in the future following adoption of the AMCP addendum on companion diagnostic tests.

**SPONSORSHIP:** This research was conducted by Genentech, South San Francisco, CA, without external funding.

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**One State Medicaid’s Strategy to Overcome Limitations to a Prescription Drug Cap Policy Using a 90-Day Maintenance List**

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**BACKGROUND:** In July 2005, a legislative action required that the Mississippi Division of Medicaid (DOM) institute a prescription benefit cap to limit the total number of prescriptions a beneficiary could receive each month to 5 (maximum of 2 brand name) for non-long-term care beneficiaries utilizing the fee-for-service (FFS) prescription benefit. An exemption to the benefit limit was allowed for beneficiaries under the age of 21 after medical necessity for additional prescriptions had been determined. At the same time as the prescription benefit limit change, the DOM released a list of medications that could be prescribed in 90-day increments to allow for more prescription fills (i.e., the 90-day fill would only count for 1 prescription “slot” in month 1, freeing up a prescription “slot” in months 2 and 3). The 90-day maintenance list has been updated several times since 2005, with the latest revision on April 1, 2012.

**OBJECTIVE:** To (a) determine the extent of 90-day maintenance list adoption among prescribers, in particular with beneficiaries consistently reaching the monthly benefit limit of 5 prescriptions at least 5 out of the 6-month study period, and (b) to describe the patient population reaching the prescription benefit limit, including demographics, prescribers, and health conditions.

**METHODS:** The target sample was identified as beneficiaries reaching the prescription benefit limit at least 5 times during the 6-month study period. Beneficiaries classified as long-term care recipients and Medicare dual eligibles were excluded from the analysis due to differences in monthly prescription benefit limits compared with the rest of the Medicaid population. Prescribers were classified as adopters or nonadopters based on whether they prescribed 90-day supplies of medicines included on the 90-day maintenance list to any Medicaid FFS beneficiary from April 1, 2012, to September 30, 2012.

**RESULTS:** After excluding long-term care recipients and Medicare dual eligibles, prescription claims were found for a total of 117,977 unique beneficiaries and 11,762 unique prescribers during the study period, representing 362,102 patient-months and 946,881 prescription records. A total of 30,913 (26.20%) beneficiaries reached the prescription benefit limit at least 1 month, with 3,518 (2.98%) beneficiaries reaching the limit ≥5 months during the 6-month study period. Of the prescribers with beneficiaries consistently reaching the prescription benefit limit (n=4,665), only 317 (6.80%) had written a 90-day prescription for those beneficiaries. Surprisingly, there were 2,265 prescribers who had adopted 90-day maintenance prescribing for beneficiaries not reaching the prescription limit but had failed to do so in the beneficiaries consistently reaching the prescription limit.

**CONCLUSIONS:** Beneficiaries consistently reaching the monthly benefit limit would most benefit from receiving a 90-day prescription of a maintenance medication. While the 90-day maintenance list has helped some beneficiaries receive more monthly medications, the relatively low number of prescribers utilizing the 90-day maintenance list indicates a need for educational outreach to encourage utilization of the list, particularly to those prescribers who have beneficiaries in greatest need of additional prescriptions. Based on this baseline analysis, a follow-up intervention study is underway that seeks to determine the extent of maintenance list adoption following a targeted educational initiative.

**SPONSORSHIP:** This research was conducted by the University of Mississippi, University, MS, without external funding.

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**BACKGROUND:** Medication therapy management (MTM) has been heavily discussed since its introduction in the Medicare Modernization Act of 2003 but has been slow growing with limited outcome data. With the release of the 2013 Center for Medicare and Medicaid Services (CMS) requirements for MTM programs, there is now room for MTM to take center stage with its inclusion into CMS’s Display Measures, with the proposal to be moved to the Star Ratings system for 2014. According to CMS, MTM is a patient-centric and comprehensive approach to improve medication use, reduce risk of adverse events, and improve medication adherence. Comprehensive Medication Reviews (CMR) are
the standard of care designated by CMS, with national average completion rates of less than 10%. In order to ensure CMS compliance, health plans are now seeking more definitive outcomes data to improve quality and provide savings opportunities.

**OBJECTIVE:** To demonstrate outcomes, patient savings, and returns on investment recognized from an interactive MTM program of a large national health plan.

**METHODS:** We analyzed a group of 2,893 patients who were eligible for a CMR during 2011. Eligible patients were contacted via telephone by a pharmacist/student pharmacist team. Results of the CMR, including pharmacist recommendations, were mailed to the patient and provider. Recommendation acceptance rates were calculated by comparing recommendations made during the CMR to prescription claims data. Direct drug expenditure (DDE) savings were calculated from 2 time periods: January through December 2010 and January through December 2011. Patients who were MTM-eligible were stratified into an intervention group (CMR completed) or control group (CMR not completed). Differences in DDE were assessed for 2 time periods using student t-tests. Return on investment (ROI) was calculated using prescription claims and service billing invoice data from a large health plan.

**RESULTS:** The CMR completion rate for MTM eligibles in 2011 was 38.1% (n = 1,103). When contacted by telephone, approximately 90% of patients opted to participate in the CMR. The acceptance rate of recommendations identified during the CMR was 82.6% (74.2% excluding vaccination recommendations). Common recommendations included needs additional drug therapy, incorrect administration, dosage too low/high, adverse drug reaction, and brand-to-generic switch. Average annual DDE savings was $1,192 for MTM eligibles who received a CMR compared with those who did not (P = 0.001). Baseline DDE for 2010 was similar in both the intervention and control groups (P = 0.06). Total annual ROI was 7.1% for 2011.

**CONCLUSIONS:** Telephonic MTM services using a pharmacist/student pharmacist model provides significant savings and ROI in patients who received a CMR compared with those who did not. A potential limitation to the study is that the health plan switched its pharmacy benefit management company in 2011; however, this variable was accounted for using the control group compared with baseline DDE in 2010. Annual trends in drug cost increases were not accounted for. Medical claims were not analyzed in this study; however, their inclusion into outcomes data will be the next step in MTM value research.

**SPONSORSHIP:** This research was conducted by VRx Pharmacy Services, LLC, Salt Lake City, UT, without external funding.

### Out-of-Pocket Costs and Prescription Reversals: The Case of Oral Linezolid

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**BACKGROUND:** Linezolid is indicated in the treatment of vancomycin-resistant Enterococcus faecium infections, complicated and uncomplicated skin and soft tissue infections (SSTI), and nosocomial and community-acquired pneumonia. Among antibiotics used to treat SSTI and pneumonia, linezolid is available in both intravenous and oral forms. This availability of intravenous and oral forms may allow for a shortened hospital stay if treatment is continued orally post-discharge, resulting in lower total costs of treating the infection. However, coinsurance benefit design for oral linezolid generally results in higher patient out-of-pocket costs (compared with copay), which is associated with prescription reversals and subsequent treatment with alternative antibiotics or in some cases no antibiotic treatment altogether. If patients who reverse their prescriptions for oral linezolid have higher medical and total health care costs as a consequence of their reversals versus patients who filled their prescriptions for oral linezolid, then payers would be advised to improve patient access to this important medication.

**OBJECTIVE:** To (a) determine the relationship between benefit design, out-of-pocket costs, and prescription reversals among Medicare members prescribed oral linezolid, post-discharge from a hospital stay for an SSTI or pneumonia, and (b) investigate the impact of reversals on rehospitalizations and total health care costs among these patients.

**METHODS:** Medicare members from a national health plan prescribed oral linezolid post-hospitalization for SSTI or pneumonia were followed retrospectively. Members were identified by an oral linezolid prescription, June 1, 2007, to April 30, 2011, where the index event was a prescription fill or reversal ≤ 2 days before or ≥ 10 days after discharge from a hospitalization for SSTI or pneumonia. The association between out-of-pocket costs and reversal, and between reversal and rehospitalization 30 days post-index, were compared for members with a prescription fill versus reversal. A generalized linear model calculated adjusted total health care costs per member controlling for age, gender, geographic region, and clinical characteristics.

**RESULTS:** A final sample of 1,062 Medicare members was available for analysis, 16.5% of members reversed their prescriptions for oral linezolid. Demographic and clinical characteristics by fill versus reversal groups indicated there were no statistical differences in age, gender, or geographic region. However, a higher percentage of members filling their linezolid prescriptions had low income subsidy/dual eligibility status compared with members reversing their linezolid prescriptions (P < 0.001). Mean out-of-pocket costs were higher for members with coinsurance ($466.52) versus copay ($7.05) plans (P < 0.001), and reversal rates rose progressively from 2% for members with out-of-pocket costs of $0 to 27% for members with out-of-pocket costs > $100 (P < 0.001). Infection-related rehospitalizations were 23% versus 9% for members with a prescription reversal versus fill (P < 0.001). While post-discharge prescription drug costs were $1,229 lower (P < 0.001), adjusted mean medical costs were $2,062 higher (P < 0.003), and total health care costs were $1,281 higher (P < 0.035) for reversal versus fill members.

**CONCLUSIONS:** Higher out-of-pocket costs and coinsurance rather than copay were associated with higher rates of reversal, and reversals were associated with higher rates of rehospitalization and adjusted total health care costs among Medicare members prescribed oral linezolid post-hospitalization for SSTI or pneumonia.

**SPONSORSHIP:** This research was funded by Humana, Inc., Louisville, KY, and Pfizer Inc., New York, NY.

### Outpatient Treatment and Clinical Characteristics of Patients with Aspergillosis in the United States

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**BACKGROUND:** Aspergillosis has many clinical manifestations, which may lead to changing treatment patterns.

**OBJECTIVE:** To evaluate new treatment patterns and clinical characteristics of U.S. patients diagnosed with aspergillosis within a large, commercially insured population.

**METHODS:** Adults aged ≥ 18 years with at least 1 inpatient admission, emergency room, or outpatient visit with an aspergillosis diagnosis (ICD-9-CM 117.3 or 484.6) between July 1, 2004, and March 2, 2011,
were identified retrospectively from the MarketScan databases. Patients with an aspergillosis diagnosis in the pre-index period were excluded. All patients were required to have at least 6 months of continuous pre-index and at least 1 month of continuous post-index health plan and pharmacy benefit enrollment. Clinical characteristics were summarized, and outpatient antifungal therapy in the post-index period was evaluated.

**RESULTS:** 5,499 patients with aspergillosis, with or without pneumonia, were identified. The mean age was 37.8 years; 48.6% were female; 39.1% had cancer; and 33.6% had an index diagnosis in the inpatient setting. Initial outpatient therapy included voriconazole (1,089; 19.8%), posaconazole (51; 0.9%), itraconazole (411; 7.5%), amphotericin B (83; 1.5%), echinocandin (132; 2.4%), more than 1 antifungal (23; 0.4%), and no therapy observed within 30 days of the index diagnosis (3,710; 67.5%). The mean duration of first observed antifungal therapy in days was 60.6; SD 91.1 for voriconazole, significantly longer than amphotericin B (19.6 + 37.4; \( P < 0.0001 \)), echinocandin (4.5 + 12.9; \( P < 0.0001 \)), and >1 antifungal (2.2 + 3.7; \( P = 0.0022 \)). Mean days of first observed antifungal therapy was similar for posaconazole (47.1 + 51.0) and itraconazole (53.6 + 63.3) when compared with voriconazole. For those receiving voriconazole, 52.4% had their index diagnosis in the inpatient setting and 47.6% in the outpatient setting. Occurrence of index aspergillosis diagnosis in the inpatient setting was similar for those initially treated with posaconazole (49.0%) and >1 antifungal (60.9%) when compared to voriconazole. However, significant differences (all \( P < 0.001 \)) were noted with itraconazole (30.2%), amphotericin B (32.5%), echinocandin (34.1%), and no antifungal therapy within 30 days of index (28.9%). The pre-index mean Deyo Charlson Comorbidity Index (CCI) score for patients receiving voriconazole was 1.9, and for those receiving no antifungal therapy within the first 30 days of index (1.6 and 1.8, respectively, \( P < 0.0001 \)). Pulmonary disease and immunocompromising conditions were commonly observed, especially cancer, neutropenia, and diabetes.

**CONCLUSIONS:** Substantial variation in outpatient antifungal therapy and clinical characteristics was observed. Combination therapy in the outpatient setting was uncommon, and most patients had no outpatient prescription claims for antifungals within the first 30 days. For those receiving therapy, voriconazole was most commonly administered, with a duration of initial treatment of about 2 months. Patients receiving voriconazole, posaconazole, amphotericin B, echinocandins, or >1 antifungal had higher pre-index CCI scores compared with those receiving itraconazole or no antifungal therapy. Immunocompromising conditions and pulmonary disease were very common. Additional studies are warranted to improve the understanding of treatment patterns and clinical characteristics of patients diagnosed with aspergillosis, especially regarding differences in outpatient versus inpatient care.

**SPONSORSHIP:** This research was funded by Astellas Pharma US, Inc., Northbrook, IL.

### TABLE

**Members Per 100,000 from a 2.6 Million Continuously Enrolled Commercially Insured Population During 2009 to 2011**

<table>
<thead>
<tr>
<th>Diagnosis prevalence during 2009 to 2011</th>
<th>RA</th>
<th>Psoriasis</th>
<th>Crohn’s Disease</th>
<th>UC</th>
<th>Ank</th>
<th>JIA</th>
<th>Un-assigned</th>
<th>Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA Psoriasis</td>
<td>454.6</td>
<td>591.9</td>
<td>220.0</td>
<td>237.8</td>
<td>37.7</td>
<td>18.2</td>
<td>N/A</td>
<td>1,517.8</td>
</tr>
<tr>
<td>Prevalence of any BAI therapy during 2009 to 2011</td>
<td>174.1</td>
<td>119.0</td>
<td>56.1</td>
<td>15.4</td>
<td>22.3</td>
<td>6.6</td>
<td>16.6</td>
<td>410.2</td>
</tr>
<tr>
<td>Percentage with diagnosis treated with any BAI during 2009 to 2011 (%)</td>
<td>38.3</td>
<td>20.1</td>
<td>25.5</td>
<td>6.5</td>
<td>59.1</td>
<td>36.3</td>
<td>N/A</td>
<td>27.0</td>
</tr>
<tr>
<td>Point prevalence of BAI therapy on December 31, 2009</td>
<td>106.1</td>
<td>70.6</td>
<td>33.5</td>
<td>7.0</td>
<td>13.3</td>
<td>3.7</td>
<td>7.6</td>
<td>241.8</td>
</tr>
<tr>
<td>Point prevalence of BAI therapy on December 31, 2011</td>
<td>130.9</td>
<td>89.8</td>
<td>42.6</td>
<td>11.1</td>
<td>17.0</td>
<td>4.9</td>
<td>10.4</td>
<td>312.8</td>
</tr>
<tr>
<td>Increase in point prevalence, December 31, 2009, to December 31, 2011 (%)</td>
<td>29.0</td>
<td>27.2</td>
<td>27.2</td>
<td>58.6</td>
<td>27.8</td>
<td>34.2</td>
<td>57.7</td>
<td>29.4</td>
</tr>
<tr>
<td>Members on BAI therapy on both December 31, 2009, and December 31, 2011</td>
<td>87.1</td>
<td>55.5</td>
<td>26.1</td>
<td>5.4</td>
<td>10.6</td>
<td>2.9</td>
<td>5.0</td>
<td>192.7</td>
</tr>
<tr>
<td>New BAI users whose first BAI claim since January 1, 2009, was between January 1, 2010, and December 31, 2011</td>
<td>53.5</td>
<td>34.8</td>
<td>19.2</td>
<td>7.3</td>
<td>7.3</td>
<td>2.2</td>
<td>7.2</td>
<td>131.5</td>
</tr>
</tbody>
</table>

*Ank = ankylosing spondylitis; BAI = biologic anti-inflammatory agent (abatacept, adalimumab, alefacept, anakinra, certolizumab pegol, efalizumab, etanercept, golimumab, infliximab, tocilizumab, and ustekinumab or rituximab if claim has diagnosis code for RA); JIA = juvenile idiopathic arthritis; N/A = not applicable; Psoriasis = psoriasis or psoriatic arthritis; RA = rheumatoid arthritis; UC = ulcerative colitis; Un-assigned = BAI cases that were not assigned a diagnosis.*
Prescriber Interventions Targeting Gaps-in-Care for Persons with Diabetes Yield Measurable Medical Cost Savings

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**BACKGROUND:** In an effort to improve appropriate treatment of people with diabetes, a prescriber intervention program was deployed in a state government account with approximately 150,000 members. The population, composed of state and public school employees, includes both retirees and dependents. A real-time predictive risk score calculated during pharmacy benefit management (PBM) adjudication was used to refine targeting of prescribers for interventions designed to improve compliance with recommended diabetes therapy guidelines.

**OBJECTIVE:** To document actual medical savings over time for members whose prescribers received highly targeted letter interventions originating from a PBM.

**METHODS:** A matched case control evaluation was designed and executed comparing medical costs of an intervention (case) group to a control group. Medical data reflecting allowed amount paid for both the intervention group and the control group were used. These data were provided by the respective payers in the form of medical claim extracts. The “Intent to Treat” (ITT) population (i.e., intervention or case group) was defined as those diabetic patients whose prescriber received a statin or angiotensin-converting enzyme inhibitors (ACE)/angiotensin receptor blockers (ARB) guideline compliance letter in the last quarter of 2010. Prescriber letters were generated for diabetic patients who were lacking statin or ACE/ARB therapy in their drug histories. The matched observational cohorts (i.e., control group) were prescribers eligible for the same intervention during the same time period but lacking such interventions. Matched control cohorts belonged to a separate employer group that elected not to have prescriber interventions during this period. The evaluation baseline was 2010, and the evaluation follow-up period was 2011.

**RESULTS:** After matching at the baseline by demographics, comorbidities, and diabetic medication adherence, 1,169 cases and controls, respectively, were selected for the statin letter cohort, and 1,040 cases and controls, respectively, were selected for the ACE/ARB letter cohort. Stratification of cases by predictive risk score facilitated successful interventions with prescribers and produced measurable savings adjusted by control in the medical plan allowed amount exceeding $42 per pation per month (PMPM) for statin letters and $23 PMPM for ACE/ARB letters in the intervention population. Estimated savings in total allowed amount for the payer based on these measures exceeded $3,000,000 for the 2011 plan year and translated to an estimated $1.71 PMPM in medical cost savings across the eligible population.

**CONCLUSIONS:** This study is important to the practice of managed care pharmacy for several reasons. First, it measures the impact on medical costs and demonstrates the value of prescription care interventions and the use of pharmaceuticals on overall health care costs. Second, it demonstrates the value of using predictive risk scores, a new and valuable tool for pharmacy management. Finally, this study proves that clinical outcomes for people with diabetes, a growing concern in the United States, can be positively impacted through properly designed intervention programs. Use of predictive risk scores to refine targeting of prescribers results in effective interventions and measurable reductions in medical costs. Furthermore, predictive risk scores are valuable adjuncts for stratifying clinical intervention targets and should be considered for use by pharmaceutical care teams.

**SPONSORSHIP:** This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

Prescription Savings Club Membership and Drug Utilization Behavior

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**BACKGROUND:** One in four American adults lack adequate prescription drug insurance coverage, which can lead to high out-of-pocket expense and poor adherence. A Prescription Savings Club (PSC) program sponsored by a national pharmacy chain can help these patients by offering generic and brand prescription drugs at a discounted rate.

**OBJECTIVE:** To examine the utilization behavior of PSC and non-PSC members taking the most common chronic prescription drug classes and determining if they differ on generic utilization and medication adherence.

**METHODS:** This was a retrospective observational study based on 2011 pharmacy data from a national pharmacy chain. Patients utilizing medications in any of the following conditions or therapeutic/drug classes (diabetes, hyperlipidemia, proton pump inhibitors [PPI], beta-blockers, and nonselective calcium channel blockers) were identified and placed into 1 of the 3 payment segments: (1) exclusively cash payers (n = 859), (2) exclusively PSC members (n = 5,614), and (3) exclusively third-party administrator members (TPA; n = 132,697). Medication adherence as measured by proportion of days covered (PDC) was compared by drug class and member segment after risk adjustment for age, gender, average dose, duration of therapy, and medications in any of the following conditions or therapeutic/drug classes. Adjusted adherence was then compared with the PSC segment, filled prescriptions for brand drugs. Among hyperlipidemia patients, 8.8% of the PSC segment, compared to 23.8% of the TPA segment, filled prescriptions for brand drugs. Compared with the cash segment, patients in the PSC segment were much more adherent.

**RESULTS:** Slightly more than 1 in 4 members with a diagnosis for which a BAI could be used received BAI therapy during 2009 to 2011. Although the number using BAIs increased 29.4% during the analysis period, on December 31, 2011, there were 1,205 such members per 100,000 not receiving a BAI. Health plans have a large exposure risk for increased BAI use. Specialty pharmacy management will need to focus on the BAI agents.

**SPONSORSHIP:** This research was conducted by Catamaran, Lisle, IL, without external funding.
The average risk-adjusted PDC for the PSC segment was 16.9% higher than the cash segment (71% vs. 55%; P < 0.001). Compared with TPA, the PSC segment tended to be more adherent to drug classes that had relatively low out-of-pocket costs (<$0.60/day) and less adherent to drug classes with higher out-of-pocket costs. In drug classes characterized with relatively low out-of-pocket costs, the average risk-adjusted PDC was 6% higher for the PSC segment than for the TPA segment (76% vs. 70%; P < 0.01). Conversely, the average risk-adjusted PDC in PPI was 13% lower for the PSC segment than for the TPA segment (52% vs. 65%) and the average risk-adjusted PDC in ibric acid derivatives was 6% lower for the PSC segment than for the TPA segment (64% vs. 70%). In both cases, the difference was statistically significant (P < 0.01), and the drug classes had relatively high out-of-pocket costs.

CONCLUSIONS: PSC members appeared to be more cost conscious with their prescription drugs as they favored generic medications with low out-of-pocket costs. When compared with the TPA segment, PSC members tended to be more adherent in drug classes that have a relatively low out-of-pocket costs and less adherent in drug classes with higher out-of-pocket costs. By promoting generic medication utilization and offering discounts, the PSC program helped reduce patients’ out-of-pocket costs and improved their medication adherence.

SPONSORSHIP: This research was conducted by Walgreen Co., Deerfield, IL, without external funding.

Reducing Drug Diversion in North Carolina: Medicaid’s Lock-In Program

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BACKGROUND: The Code of Federal Regulations (CFR) establishes a rule that allows Medicaid agencies to administer lock-in programs for recipients who overutilize prescription drugs. According to the most recent Medicaid Drug Utilization Review Annual Reports submitted by each agency, approximately 90% of states use lock-in programs to identify potential fraud or abuse of controlled drugs. In October 2010, North Carolina Department of Health and Human Services (DHHS) implemented a lock-in program. The program identified members who received multiple prescriptions for opiates and antianxiety medications. These members received clinical review and lock-in consideration.

OBJECTIVE: To determine the impact of North Carolina Medicaid’s lock-in program on pharmacy and medical services utilization and costs.

METHODS: Medicaid members with a history of more than 6 claims for opiate medications, more than 6 claims for benzodiazepine/antianxiety medications, or prescriptions for opiates and/or benzodiazepine/antianxiety medications from more than 3 prescribers in the most recent 2-month period were evaluated by a clinical pharmacist for lock-in. Based on the clinical review, members were recommended for lock-in to a single pharmacy and physician in the pharmacy claims processing system and Medicaid Management Information System (MMIS). Pharmacy and medical (i.e., inpatient, emergency department, and dental services) utilization trends and costs were evaluated for 6 months before and after lock-in among the targeted and comparison groups. The comparison group qualified for the lock-in program but was not selected for lock-in during the 12-month observation period.

RESULTS: One hundred and five members were locked in during November 2010. The number of opiate and benzodiazepine/antianxiety prescriptions in the lock-in group decreased from 2,728 in 6 months prior to lock-in to 1,207 6 months after lock-in compared with an increase of 1,502 to 1,766 in the comparison group. Decreased use was also seen with other medications, such as anticonvulsants, NSAIDS, and skeletal muscle relaxants, while antidepressant use increased. Overall, the total amount paid for medications decreased 10% in the targeted group compared with an increase of 27% in the comparison group. Medical utilization totals decreased 44% in the target group and increased 15% in the comparison groups, while costs decreased 51% and 39%, respectively. Overall, costs decreased $392,481 (39%) in the target group compared with $175,120 (28%) in the control group.

CONCLUSIONS: The North Carolina Division of Medical Assistance’s lock-in program decreased pharmacy and medical utilization and associated costs.

SPONSORSHIP: This research was conducted by Xerox State Healthcare, LLC, Richmond, VA, without external funding.

Retrospective Evaluation of a Long-Acting Insulin Switch on Hemoglobin A1c: Glargine to Detemir (RELISH)

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BACKGROUND: In 2011, Kaiser Permanente Redwood City (RWC) conducted a pilot study to convert type 2 diabetes patients using insulin glargine to insulin detemir. Previous randomized parallel-group studies in patients with type 2 diabetes have shown that there was no significant difference in mean hemoglobin A1c (HbA1c) between patients treated with glargine and detemir. There are very few studies of therapeutic interchanges from insulin glargine and detemir within the same patient group.

OBJECTIVE: To evaluate the clinical impact of a therapeutic interchange from insulin glargine to insulin detemir in type 2 diabetes patients at Kaiser Permanente Redwood City.

METHODS: The Retrospective Evaluation of a Long-Acting Insulin Switch on Hemoglobin A1c: Glargine to Detemir (RELISH) was a retrospective, single arm, observational study. Retrospective chart reviews were conducted on patients who participated in the glargine-to-detemir conversion to determine eligibility for the study based on the inclusion and exclusion criteria. The primary endpoints included HbA1c at 3–6 months after the glargine-to-detemir conversion, the change in HbA1c from baseline to the end of the study, proportion of patients with HbA1c <7% and ≥7% at baseline and after the conversion, the proportion of patients who continued on the new insulin detemir regimen versus flipped back to insulin glargine, and the documented reasons for flipping back to insulin glargine. Secondary endpoints included diabetes-related emergency department visits and reported hypoglycemia episodes within the first 4 months after insulin detemir prescription pickup. A two-tailed Student t-test with a significance level of 0.05 and a confidence level of 95% was conducted to determine if there was a significant difference in the change in HbA1c from baseline after the conversion. Subgroup analysis was performed for patients not enrolled in a PharmD/PhRN diabetes care management program (CM).

RESULTS: Sixty-two patients qualified for the study based on inclusion and exclusion criteria. In all patients with available baseline and post-conversion HbA1c data (n = 41), the mean baseline HbA1c changed (HbA1c 8.1% [SD 1.3] vs. HbA1c 8.4% [SD 1.6], respectively, with mean change in HbA1c 0.29% [SD 0.7], P = 0.01). After exclusion of patients in CM (n = 34), there was no difference in mean HbA1c pre- and post-conversion (HbA1c 7.9 [SD 1.4] vs. HbA1c of 8.0% [SD 1.7], respectively, with mean change HbA1c 0.29% [SD 0.7], P = 0.320). There was no change in the proportion of patients with HbA1c <7% from baseline to post-conversion in either group. Nine patients (14.5%) flipped back to insulin glargine after successful conversion to detemir. Within 4 months...
after conversion, 9 patients reported hypoglycemic events, and 1 patient had a diabetes-related emergency department visit.

**CONCLUSIONS:** The change in mean HbA1c after conversion from insulin glargine to insulin detemir suggests that diabetes control may have been affected by the switch. However, there were confounding factors (such as CM) that may have affected these results. After excluding the CM patients, we found that converting insulin glargine to insulin detemir provided similar blood sugar control with no changes in mean HbA1c. In patients that do not require the additional intensive management, a therapeutic interchange from insulin glargine to insulin detemir results in similar blood sugar control.

**SPONSORSHIP:** This research was conducted by Kaiser Permanente, Redwood City, CA, without external funding.

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**FIGURE**

**Annual Average Cost of Care for Rheumatoid Arthritis Patients Treated with Specialty Drugs**

<table>
<thead>
<tr>
<th>Specialty Drug Category</th>
<th>2008 (n=1,471)</th>
<th>2009 (n=1,472)</th>
<th>2010 (n=1,556)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialty (54.7%)</td>
<td>$29,652</td>
<td>$32,852</td>
<td>$34,163</td>
</tr>
<tr>
<td>Specialty (51.7%)</td>
<td>$11,203</td>
<td>$13,519</td>
<td>$18,098</td>
</tr>
<tr>
<td>Specialty (50.8%)</td>
<td>$5,015</td>
<td>$5,286</td>
<td>$12,812</td>
</tr>
<tr>
<td>Specialty (50.7%)</td>
<td>$12,128</td>
<td>$13,519</td>
<td>$18,098</td>
</tr>
</tbody>
</table>

*Commercially insured members continuously enrolled during analysis year.
RA = rheumatoid arthritis.*
share and insurer payments. The compound annual growth rate (CAGR) was used to describe cost trends.

**RESULTS:** RA diagnosis prevalence was 41 per 10,000 continuously enrolled members in 2008 (4,231 of 1,038,638) and increased slightly to 43 per 10,000 in 2010 (4,398 of 979,739). RA specialty drug utilization among members with a diagnosis was consistent over the 3 years at a rate of 1,471 (34.6%) of 4,251 members in 2008 and 1,556 (35.4%) of 4,398 members in 2010. Although RA drug utilization remained constant, the total cost of care CAGR was 7.3% from 2008 to 2010 (figure). All other medical costs were $11,252 in 2008 and increased to $13,710 in 2010, CAGR 10.4%. Combined RA medical and Rx specialty drug costs accounted for 54.7% ($16,218 of $29,652) of the total cost of care in 2008 and was slightly lower at 53.0% in 2010 ($18,098 of $34,163), CAGR 5.6%. The medical and Rx specialty drug CAGRs over the 3-year period were 2.7% and 6.9%, respectively. RA specialty drug costs were approximately 70% from the Rx benefit.

**CONCLUSIONS:** In 2010, RA medical and Rx specialty drug costs were more than half of the total cost of care. The fastest growing category within the total cost of care was all other medical costs at 3.9 times the rate of all other medical RA specialty drug costs (CAGR 10.4% vs. 2.7%) suggesting that RA specialty drugs are not decreasing medical costs. While specialty drug utilization was relatively flat from 2008 to 2010, the RA category should continue to be monitored because of new drugs coming in the pipeline. Health plans and insurers need to have a full understanding of where dollars are being spent in conditions such as RA and develop management programs to ensure the most effective RA drug therapy use.

**SPONSORSHIP:** This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

### Specialty Drugs Are Forecasted To Be 50% of All Drug Expenditures in 2018

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**BACKGROUND:** Specialty drugs include biologics and other drugs that require special handling, are typically injected, and are more expensive than traditional small molecule oral drugs. Billed via either the medical or pharmacy benefit, specialty drugs were historically associated with rare medical conditions such as hemophilia. More recently, however, specialty drugs have come to dominate the treatment of more common chronic conditions such as rheumatoid arthritis and multiple sclerosis. The increase in new specialty drug approvals and progressive price increases have resulted in the need for payers to forecast specialty drugs expenditures separately from nonspecialty traditional drugs.

**OBJECTIVE:** To integrate medical and pharmacy drug expenditures from 2005 through 2011, trend these expenditures by specialty and traditional drugs, and forecast when specialty drugs will become 50% of all drug expenditures.

**METHODS:** Prime Therapeutics’ integrated medical and pharmacy database of 9 million currently active commercially insured members was queried to identify monthly drug specialty and nonspecialty expenditures. Specialty drugs were defined as all drugs on the Prime Therapeutic pharmacy benefit specialty drug management list and most medical benefit process drugs (e.g., J-codes) with the complete exclusion of vaccines and diagnostics. All drug claims not classified as specialty were defined as nonspecialty. From January 2005 to December 2011, the monthly proportion of specialty drug expenditures out of the total drug expenditures was calculated. To obtain the expenditure trend, the specialty and nonspecialty per member per month total paid (PMPM) monthly percentage increase in expenditures using a rolling 12-month method was calculated from January 2007 to December 2011. The forecast was calculated from the combined specialty medical and pharmacy benefit and the nonspecialty 5-year historical trends.

**RESULTS:** In 2005, specialty drugs represented 16% of all drug (medical and pharmacy benefit) expenditures, but by December 2011, specialty drugs had become 26.8% of all drug expenditures (see figure). From 2007 through 2011, nonspecialty drug PMPM rolling 12-month trend values had remained in the single digits, starting at 1.4% in January 2007 and ending at -2.3% in December 2011. The rolling 12-month specialty drug trend PMPM values were in the middle teens, starting at 13.5% in January 2007 and ending at 15.7% in December 2011. Assuming a specialty PMPM trend of 15% and a nonspecialty trend of zero, specialty drug expenditures were forecasted to be 50% of total drug spend by 2018.

**CONCLUSIONS:** Health insurers should utilize integrated medical and pharmacy data when performing specialty drug trending and forecasting. The double-digit specialty drug trends coupled with the flat nonspecialty drug trend have resulted in an increased importance of focusing health insurer resources toward managing specialty drugs. Health insurers will need to increase their vigilance of specialty drugs to encourage the most cost-effective use.

**SPONSORSHIP:** This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

### Store and Prescription Characteristics Associated with Primary Medication Nonadherence

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**BACKGROUND:** Primary medication nonadherence (PMN) is any instance whereby patients fail to initiate a pharmacotherapy regimen after receiving a prescription for a new therapy. Currently, there is little in the literature that provides information on how to measure PMN across pharmacies and what factors are related to PMN. The Pharmacy...
Quality Alliance (PQA) has developed a quality measure to assess the rates of PMN in pharmacies. The PMN measure is calculated by dividing the number of unclaimed (not picked up after 30 days) electronic prescriptions for newly initiated drug therapy (or appropriate alternative) by the total number of electronic prescriptions for newly initiated drug therapy during the measurement period (for patients 18 years and over). The measure only includes drugs for chronic conditions.

**OBJECTIVE:** To measure PMN in a grocery chain pharmacy and to identify the prescription-level (prescriber and patient) and store characteristics associated with PMN.

**METHODS:** The PQA-developed PMN measure was used, and PMN rates were calculated for 100 pharmacies in a large grocery chain as well as an overall rate. The grocery chain provided de-identified, transactional data for calendar years 2009-January 2012 (de-identified, unique patient and store codes were available). Investigators examined adult individuals with a new electronic prescription for any of a number of medications included in the PQA PMN measure during the measurement period and determined whether the medication (or appropriate alternative) was claimed within 30 days. The wash-out period for the data was 180 days prior to January 1, 2011. This period was used to determine that a prescription was a newly initiated prescription for the patient. The PMN measurement period was from January 1, 2011, to December 31, 2011 (plus 30 days after to assess whether prescriptions were claimed). Prescription-level (patient and prescriber characteristics associated with a prescription) and store-level predictors of whether a prescription was unclaimed were assessed using multilevel logistic regression with a random intercept. PROC GLIMMIX in SAS version 9.3 was used for the analysis.

**RESULTS:** Of the e-prescriptions during the 1-year observation period, 29,238 were for new therapy as defined by the PMN measure, and 3,570 (12.2%) of those new prescriptions (or drug alternatives) were not claimed within the 30-day period. There was significant variability among the 100 pharmacies. The estimated odds of an unclaimed prescription were different significantly among drug classes comprising the PQA PMN measure ($P<0.0001$) and were higher as out-of-pocket costs increased ($P<0.0001$), when the prescription was accompanied by another prescription on the same day ($P<0.0001$) and for primary-care and specialist physicians relative to physician assistants and advanced practice nurses ($P=0.0002$). The estimated odds were slightly higher for younger individuals ($P=0.0008$) and when dispensed at stores with lower prescription volumes ($P=0.0017$). Neither the gender of the patient ($P=0.733$) nor the payment source ($P=0.543$) were related to whether the prescription went unclaimed in the multivariable model.

**CONCLUSIONS:** Based on the calculated rates, PMN is a significant problem in this setting. Efforts directed at further understanding of this behavior and how to reduce its occurrence are warranted.

**SPONSORSHIP:** This research was funded by NACDS Foundation, Alexandria, VA.

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**FIGURE** Months Duration on Suboxone

![Graph showing months duration on Suboxone](image-url)
to Suboxone prescribers informing them of overlapping pharmacy claims. A week following mailing, a pharmacist contacts Suboxone and opioid prescriber(s) by telephone to ensure awareness of the concomitant use. If a member continues to fill opioids/tramadol, future opioid/tramadol pharmacy claims may be denied.

**OBJECTIVE:** To identify members who are taking Suboxone and filling opioids/tramadol, determine if members will continue Suboxone treatment after opioids are filled, assess need for further intervention to help members achieve Suboxone treatment success, and evaluate the Suboxone prior authorization approval time period.

**METHODS:** Paid Suboxone pharmacy claims were evaluated for those members who were identified as filling Suboxone and opioids/tramadol to determine Suboxone length of therapy duration. Additionally, coverage eligibility was analyzed for at least 6 months following the first Suboxone claim.

**RESULTS:** Descriptive statistics and a scatter plot describing the relationship between length of continuous eligibility and enrollment were produced. The scatter plot strongly suggested a linear relationship between total length of eligibility and length of Suboxone therapy. A regression analysis of the 2 variables captured 82% of the variation ($r^2 = 0.82$). The range of days supplied for Suboxone was 1 to 105 months. The linear relationship suggests that members who maintain their insurance coverage continue to fill Suboxone. 60% of members assessed who were eligible for coverage for a year did fill Suboxone for a year. 126 of 880 members (14%) quit filling Suboxone after 1 month even though they were eligible for coverage for 7-18 more months.

**CONCLUSIONS:** Many members fill Suboxone for the duration of coverage eligibility. Most members will continue Suboxone treatment after filling opioids/tramadol. Members assessed either continued receiving Suboxone for the duration of coverage eligibility (60%), stopped filling after less than 3 months of Suboxone treatment (23%), or received at least 3 months of Suboxone but did not continue to fill Suboxone for the duration of coverage eligibility (17%). The 14% of members who quit filling Suboxone after 1 month are possible treatment failures, who may continue abusing opioids. A root-cause analysis may assist in identifying how the patient safety program may be enhanced to better assist these members. Since many members take Suboxone for years, extending the Suboxone prior authorization approval period to 12 months may be more time and cost efficient for both the provider and prior authorization department.

**SPONSORSHIP:** This research was conducted by Aetna Inc., Hartford, CT, without external funding.

**The 2012 U.S. Payor Landscape: Results from a Survey of Medical and Pharmacy Directors on Comparative-Effectiveness Research**

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**BACKGROUND:** To control the growth of health care costs and ensure appropriate utilization of products, payors use a variety of formulary management tools. Current efforts by governments, quasi-governmental entities, and private-public collaborations to introduce better comparative study information to the formulary decision-making process is underway.

**OBJECTIVE:** To determine the types of approaches preferred by medical and pharmacy directors of U.S. health plans, insurers, and pharmacy benefit managers to enhance the pharmacy and therapeutics (P&T) decision-making process and how medications accepted onto the formulary should be covered.

**METHODS:** This study used an online interactive survey of U.S. medical and pharmacy directors (MDs and PDs, respectively). In addition to a 10-point Likert scale (10 = agree completely, 1 = disagree completely), some questions used qualitative responses and interpretive analysis to explore beliefs about certain statements.

**RESULTS:** The respondents represented 44 commercial plans, 19 Medicaid plans (14 HMO/PPO and 5 traditional fee for service [FFS]), and 23 Medicare plans (8 FFS, 15 HMO/PPO). The study participants were asked specifically about their expectations for and use of comparative-effectiveness research (CER) data. Respondents indicated that current progress in obtaining usable CER information was slow, with an average rating of only 4.17 (MD = 4.06; PD = 4.40) on the 10-point scale. However, they anticipated regularly utilizing CER information in formulary decision making by 2015 (average rating = 6.03 [MD = 6.0; PD = 6.1]). Their rating of the use of evidence-based medicine in coverage decision making today was somewhat higher, at an average of 7.08 (MD = 7.38; PD = 6.40). The survey participants pointed out that emerging CER results will greatly affect the following areas: optimization/improvement of clinical guidelines (22.6%), medical/pharmacy benefit management (19.4%), evaluation of the value (16.1%), appropriateness of care (16.1%), pharmaceutical research and development (6.5%), with 16.1% unsure or uncertain. When asked how they would change their plans’ or PBMs’ pharmacy benefit design, the most frequent responses were incorporating CER data into copayment tiering and management (13.3%), further incentivizing adherence through benefit design (10.0%), and altering benefit design structures for specialty pharmaceuticals (10.0%; primarily to lower member out-of-pocket costs). In regard to improving their plans’ PBMs’ P&T committee process, 23.3% offered that they would use more CER results in the decision-making process; 13.3% would enhance the physician/specialist presence on the review committee; and 6.6% mentioned that they would increase the time allowed for review to allow for a more in-depth evaluation.

**CONCLUSIONS:** The environment for P&T committee decision making in managed care is undergoing a series of changes, and payer medical directors and pharmacy directors, who commonly serve as P&T committee members, have distinct opinions as to how to alter the process to adapt to these influences.

**SPONSORSHIP:** This research was conducted by TPG National Payor Roundtable, Glastonbury, CT, and JeSTARx Group, Newfoundland, NJ, without external funding.

**The Effect of Medication Therapy Management (MTM) Services on the Costs of Diabetes Patients with Complications: A Retrospective Medical Claims Analysis**

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**BACKGROUND:** Various studies have examined the association between medication therapy management (MTM) services and management of chronic diseases. However, few reports track the sustained impact of MTM on medical costs over time.

**OBJECTIVE:** To estimate the financial impact of exposure to MTM services on medical costs for patients with complex diabetes compared with a less complex control group with diabetes who did not receive MTM services during an 18-month demonstration period.

**METHODS:** This retrospective cohort study examined medical claims of state employees with a diagnosis of diabetes and exposed to MTM services ($n = 101$) at Fairview Health Systems clinics during a pilot program that started in August 2007. Data for the 6 months prior to the first MTM visit (index date for the MTM group) and 18 months following
were analyzed. Results were compared with state employees who had diabetes but were not exposed to MTM (n=80, index date defined as the first medical claim that occurring after August 1, 2007). Multivariate generalized linear regression models with gamma distribution and log link functions were used to estimate the potential differences in total medical costs between the 2 study groups controlling for age, sex, a modified Charlson score, complexity of diabetes, and occurrence of hospitalization in the baseline period for each 6-month period (baseline and 3 subsequent 6-month periods). A multivariate repeated measures generalized linear regression model with gamma distribution and log link function within a generalized estimating equations framework (GEE) was used to estimate the potential differences in medical costs between the 2 study groups in 18 months following the index date. Patients' claims in the baseline period (6 months pre-index) were used to define the diabetes complexity variable (presence of diabetes complications such as cardiovascular diseases, hypertension, renal disease, and hyperlipidemia identified through ICD-9-CM codes). The modified Charlson index included only those conditions not already controlled for in defining the complexity of diabetes. Hospitalizations were determined using room and board specific revenue codes and/or CPT codes specific for inpatient services.

**RESULTS:** T-tests and chi-square analysis found no significant differences between the study groups at the 0.05 level with the exception of diabetes associated complications, which was significantly higher in the MTM group (72.3% vs. 18.8%; *P*<0.001), suggesting a more complex diabetes presentation in the MTM group. While the MTM group had significantly higher adjusted medical costs for the 6 months prior to index date ($14,261 vs. $8,727; *P*<0.01), nonsignificant differences were found at each of 3 consecutive 6-month post-MTM period comparisons: months 1-6 ($11,778 vs. $9,510); months 7-12 ($14,608 vs. $15,155); and months 13-18 ($9,242 vs. $8,806). The GEE repeated measures model showed that marginal adjusted costs were not significantly different between the 2 groups over the entire 18-month period ($14,793 vs. $11,483; *P*<0.43).

**CONCLUSIONS:** Exposure to MTM services resulted in overall reduction in medical costs for more complex patients with diabetes, moving them towards an economic burden equivalent to that of less complex diabetes patients. MTM services contribute to cost management strategies of value to health plans and self-insured employers.

**SPONSORSHIP:** This research was conducted by the University of Minnesota Graduate School, Minneapolis, MN, without external funding.

**Time to Discontinuation of Newly Initiated Biologic Therapy for Adult Crohn’s Disease (Infliximab Versus Adalimumab) and for Rheumatoid Arthritis (Infliximab Versus Adalimumab or Etanercept)**

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**BACKGROUND:** The 3 most commonly used tumor necrosis factor (TNF) blockers are the self-injectables adalimumab and etanercept, which are generally billed via pharmacy benefit, and intravenously infused infliximab, which is generally billed via medical benefit. All 3 are FDA approved to treat rheumatoid arthritis (RA), and infliximab and adalimumab are both approved for adult Crohn’s disease. Adult Crohn’s and RA treatment represent more than half of TNF blocker use. As insurers develop TNF blocker management strategies, it is important to understand the comparative effectiveness of these agents within their managed populations.

**OBJECTIVE:** To compare the time to discontinuation (d/c) of newly initiated biologic treatment of adult Crohn’s disease using infliximab or adalimumab and of newly initiated biologic treatment of RA using infliximab, adalimumab, or etanercept. Earlier d/c may indicate a less effective therapy.

**METHODS:** Integrated pharmacy and medical claims data from commercially insured youngers than 65 years were used to identify members with a first claim in 2010 or 2011 for infliximab, adalimumab, or etanercept, which was preceded by at least 365 days of continuous enrollment but no prior biologic claim, defined as abatacept, adalimumab, anakinra, certolizumab pegol, etanercept, golimumab, infliximab, tocilizumab, or rituximab. Using ICD-9-CM diagnosis codes on all medical claims, members were assigned their most frequently coded diagnoses among the FDA-approved indications and limited to those assigned RA or Crohn’s disease (and older than 18 years). Kaplan-Meier analysis was used to calculate and present the time to d/c of therapy, defined as the first adalimumab or etanercept claim followed by a gap of more than 60 days plus the days supply, the first infliximab claim followed by a gap of more than 120 days, or a switch to a different biologic agent. Members were followed to d/c, disenrollment from plan, or December 31, 2011 (up to 24 months), with censoring at the time of disenrollment or December 31, 2011. A log rank test was used to statistically compare time with d/c stratified by drug for Crohn’s and for RA.

**RESULTS:** There were 1,003 members who met study criteria for adult Crohn’s: 494 infliximab and 509 adalimumab, respectively, 48.9% and 52.3% female, with mean age 38.5 and 39.5. Duration of therapy was significantly shorter for the Crohn’s infliximab patients (log rank chi-square 6.07, *P*<0.0138), with 25% d/c by 4 months and 50% by 16 months compared with 6 and 22 months, respectively, for adalimumab. There were 2,821 members who met criteria for RA: 284 infliximab, 1,301 adalimumab, and 1,236 etanercept, respectively, 72.5%, 73.2%, and 74.4% female, with mean age 50.0, 48.1, and 47.8. Duration of therapy was not significantly different among the RA infliximab, adalimumab, and etanercept patients, with 25% d/c for each agent by less than 4 months and 50% of each by about 13 months.

**CONCLUSIONS:** Time to d/c was not found to be different among members with RA started on these 3 agents. Adalimumab new starts for Crohn’s treatment persisted on therapy significantly longer than
infliximab. These findings are observational and may reflect differences between patients selected to receive 1 therapy over the other. Further research should be performed to assess other outcomes, such as disease control and costs.

**SPONSORSHIP:** This research was conducted by Prime Therapeutics LLC, Eagan, MN, without external funding.

### Treatment Patterns and Health Care Cost of Oncology Patients Treated with Bevacizumab in Hospital Outpatient and Office Settings

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**BACKGROUND:** Declining health plan reimbursements for physician-administered chemotherapy have led to speculation and initial evidence that the population of oncology patients may be shifting from physician offices (OFF) to hospital outpatient clinics (HOS). The extent to which this applies to oncology patients treated with bevacizumab and whether the effect varies by tumor type is unclear.

**OBJECTIVE:** To examine treatment patterns and costs for patients in each site of service.

**METHODS:** This retrospective study used medical and pharmacy claims (2006-2011) from a national U.S. health plan to identify oncology patients (aged 18 years or older) initiating treatment with bevacizumab, diagnoses included metastatic colorectal cancer (CRC), lung cancer (LC), and other cancers. Patients were required to be enrolled in the health plan for 6-months pre- and 6-months post-initiating bevacizumab, patients who died were retained in the study. Patients were stratified into cohorts based upon the location of bevacizumab treatment: HOS or OFF. A 6-month baseline period assessed patient characteristics; a variable follow-up period (until discontinuation of bevacizumab, disenrollment, or March 2011) assessed treatment patterns, utilization, and costs. Weight-based dose per administration was estimated based on population average weights.

**RESULTS:** A total of 3,216 qualifying oncology patients initiated bevacizumab treatment, with 219 HOS and 2,997 OFF patients. A significantly higher proportion of HOS patients were in Medicare Advantage plans (78.08% for HOS vs. 17.82% for OFF; P<0.001), and HOS patients were older on average (mean age 66.63 years in HOS vs. 59.20 years in OFF; P<0.001). Among CRC patients (n=1,171) and LC patients (n=911), 6.40% and 6.59%, respectively, initiated bevacizumab in the HOS setting. The proportion of patients receiving bevacizumab in HOS settings increased over time, and differences between OFF and HOS in dose administered narrowed over time (table). Duration of therapy was shorter in HOS (210 days in OFF vs. 182 days in HOS; P<0.003), and a Cox proportional hazards model found HOS patients were more likely to discontinue therapy after adjusting for patient characteristics (HR of discontinuing therapy in HOS vs. OFF: 1.19, 95% CI: 1.03, 1.38). Multivariate analysis indicated that costs were, on average, 9.6% higher for the HOS cohort (P<0.001) after adjusting for patient characteristics, with variation by tumor type. Cost per infusion were higher in HOS ($9,513) than in OFF ($6,672); P<0.001.

**CONCLUSIONS:** This study found that the percentage of patients treated in the HOS setting increased over time. HOS patients were associated with higher average costs and shorter treatment duration compared with OFF. Bevacizumab’s label indicates that patients should be treated until disease progression. The implications of the shorter duration of treatment in the HOS setting are unclear, since claims data cannot provide reasons for treatment discontinuation. Further investigation of the shift to hospital outpatient treatment is warranted.

**SPONSORSHIP:** This research was funded by Genentech, Inc., South San Francisco, CA.

### Treatment Patterns in Patients with HER2+ or ER/PR+ Metastatic Breast Cancer


**BACKGROUND:** The determination of hormone and HER2 status is an important pathological component to predicting the outcomes and prognoses of patients with metastatic breast cancer (mBC). While treatments for HER2+ and ER/PR+ have improved over the past decade, little research has been conducted on whether these treatments are reflected in real-world treatment patterns. This is in large part because most secondary data sources do not track hormone status.

**OBJECTIVE:** To examine treatment patterns across multiple cohorts of HER2+ and ER/PR+ mBC patients.

**METHODS:** The Varian Medical Oncology electronic medical record (EMR) database of outpatient oncology clinic data from the United States was used to identify 3,994 women with a diagnosis of mBC between January 1, 2003, and December 31, 2010, of which hormone status was available on 2,404 women. The HER2+ and ER/PR+ patients were each divided into 2-year cohorts based on index diagnosis date of metastatic disease to examine relative use of treatment regimens over time and line of therapy.

**RESULTS:** Of 2,404 women, 223 were HER2+ and 789 were ER/PR+. Baseline characteristics were similar for both groups in terms of age, race, duration of disease, and stage at diagnosis. Across all HER2+ cohorts, first-line (1L) use of trastuzumab (T), either alone or in combination, ranged from 50%-57%. T-taxane-platin regimens were most common. Prior to 2007, cyclophosphamide/doxorubicin regimens were used in 11%-15% of patients. In second-line (2L) use, T-containing regimens ranged between 50%-74%, with the majority being in combination with a taxane, platin, or both. Single-agent taxanes and T/vinorelbine combination were used prior to 2005. In third-line (3L) use, T was part of 61%-71% of the regimens, with capecitabine/T, anastrozole/T, and vinorelbine/T combinations being the most frequent. Across all ER/PR+ 1L cohorts, single-agent anastrozole (9%-13%) and letrozole (9%-17%) were used most frequently, followed by fulvestrant and capecitabine. Cyclophosphamide/doxorubicin use decreased from 16.5% in 2006 to 1.4% in 2010. Among the 2L patients, paclitaxel use was highest in 2006.

---

**TABLE**

<table>
<thead>
<tr>
<th>Year Initiating Bevacizumab</th>
<th>Initiating Treatment (%)</th>
<th>Average Bevacizumab Dose (mg/kg per Administration)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OFF Setting</td>
<td>HOS Setting</td>
</tr>
<tr>
<td>2006</td>
<td>96.13</td>
<td>3.87</td>
</tr>
<tr>
<td>2007</td>
<td>94.24</td>
<td>5.76</td>
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<tr>
<td>2008</td>
<td>94.88</td>
<td>5.12</td>
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<tr>
<td>2009</td>
<td>91.76</td>
<td>8.24</td>
</tr>
<tr>
<td>2010</td>
<td>88.97</td>
<td>11.03</td>
</tr>
</tbody>
</table>

*P<0.001.

HOS = hospital outpatient clinic; mg/kg = milligrams to kilograms; OFF = physician offices.
Interestingly, its usage has been continuously increasing since 2007. Was not affected by the Medicare Part D formulary exclusion program.

CONCLUSIONS: This retrospective cohort study highlights the changes that have occurred over the past decade in the treatment of patients with HER2+ and ER/PR+ mBC in the United States. A decline in the use of anthracyclines as 1L therapy was observed, similar to a recent publication on adjuvant treatment in a Medicare population, although in contrast, no corresponding increase in taxane use was noted. Due to incomplete data on the HER2 and hormonal status of mBC patients, and small sample sizes in 3L-treated patients, additional research is needed to verify whether the treatments reflect general practice and adherence to National Comprehensive Cancer Network guidelines.

SPONSORSHIP: This research was funded by sanofi, Cambridge, MA.

Trend in Benzodiazepine Utilization Under Medicare Part D in U.S. Outpatient Settings, 2005 to 2009

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BACKGROUND: Since 2006, Medicare Part D has excluded benzodiazepine prescriptions from coverage due to its significant side effects in the elderly. However, this formulary exclusion has raised serious concerns over the potential consequences for poor health outcomes and resulting higher overall health care costs.

OBJECTIVE: To examine the trend in benzodiazepine utilization under Medicare Part D in U.S. outpatient settings.

METHODS: This project proposed a secondary data analysis using a national longitudinal database. Data was extracted from the National Ambulatory Medical Care Survey (NAMCS) between January 2005 and December 2009. Subjects were derived from ambulatory physician office visits where the primary payment source was Medicare, and at least 1 benzodiazepine prescription was written. A series of descriptive statistics were used to estimate the national weighted frequency of each drug over a 5-year study period. Data trends were graphically plotted and further analyzed using weighted time series regression analyses. All analyses utilized SAS PROC SURVEY applications to adjust for the complex sampling design employed by the NAMCS database.

RESULTS: There were an estimated 4.85 billion visits to office-based physicians in the United States from 2005 to 2009 of which 1.18 billion (24.26%) were made by Medicare recipients. 86.52 million (7.3%) of these Medicare visits received at least 1 FDA-approved benzodiazepine prescription, including Alprazolam (33.4%), Lorazepam (21.2%), Clonazepam (16.3%), Diazepam (12.2%), Temazepam (7.5%), Midazolam 1.6%, Clorazepate Potassium (1.6%), Triazolam (0.8%), Oxazepam (0.8%), Flurazepam Hydrochloride (0.7%), Chloridiazepoxide Hydrochloride (0.4%), Estazolam (0.17%), and Quazepam (0.02%). After 1 year of Medicare Part D, benzodiazepine use for Medicare patients decreased 1.38% from 14.72 million in 2005 to 14.52 million in 2006. However, the usage dramatically increased 20% from 14.52 million in 2006 to 17.43 million in 2007 and continuously raised to 21.72 million in 2009. Weighted regression analysis showed a significant linear trend for benzodiazepine use during the 5-year study period (P = 0.014, adjusted R² = 0.8625).

CONCLUSIONS: The study findings indicated that benzodiazepine use was not affected by the Medicare Part D formulary exclusion program. Interestingly, its usage has been continuously increasing since 2007. Several factors could explain this phenomena: (a) low costs of these drugs and patients willing to pay out of pocket; (b) physicians prescribing privilege; (c) Medicare supplement program; and (d) NAMCS data limitations. Although benzodiazepines will be allowed on Medicare Part D formularies in 2013, there is an extraordinary responsibility on the part of policy makers to respect individualized clinical decisions and suggest appropriate evidence-based intervention.

SPONSORSHIP: This research was conducted by Nova Southeastern University, Fort Lauderdale, FL, without external funding.

Trends in Utilization and Cost of Conventional and Biologic Therapies for Rheumatoid Arthritis

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BACKGROUND: Rheumatoid arthritis (RA) is an autoimmune disorder that poses a significant public health burden. The treatment of RA has evolved dramatically over the past few decades with the availability of conventional disease-modifying antirheumatic drugs (DMARDs) as well as newer biologic DMARDs for more severe disease. The American College of Rheumatology (ACR) did not provide guidelines regarding the utilization of biologic agents until 2008, when they recommended the use of conventional DMARDs and/or biologic DMARDs, depending on the stage/progression of the disease, efficacy of current treatment, and presence of other comorbid conditions, among other factors.

OBJECTIVE: To quantify the impact of evolving RA treatment guidelines on cost and utilization trends over a 6-year period in terms of conventional and biologic therapies.

METHODS: This was a retrospective longitudinal study of CVS Caremark de-identified administrative claims data of therapy utilizers between January 1, 2006, and December 31, 2011. The analyses were limited to users of the conventional and biologic therapies used to treat RA and related conditions. Conventional DMARD therapies included auranofin, azathioprine, gold sodium thiomalate, hydroxychloroquine, leflunomide, and methotrexate. Biologic DMARD therapies consisted of anti-tumor necrosis factors (TNFs; adalimumab, anakinra, certolizumab, etanercept, golimumab, and infliximab) and non-TNFs (abatacept, rituximab, and tocilizumab). Utilization and costs were measured on a per-member per-year (PMPY) and per-utilizer per-year (PUPY) basis.

RESULTS: On average, 380,472 pharmacy benefit eligible members used these medications each year. Over the study period, conventional DMARDs accounted for 67% of overall utilization based on days’ supply. The relative utilization of conventional DMARD therapy has steadily declined compared with biologics. In 2006, DMARDs accounted for 77.6% of total days supply; in 2011, DMARDs made up just 56.4%, representing a 27% decline in the relative utilization of these therapies. The relative utilization of biologic therapies nearly doubled over the same time period. Over the 6-year study period, PMPY gross cost of conventional DMARDs decreased 36%, from $0.61 to $0.39. Although there was a decrease in PMPY gross cost experienced between 2007 and 2008, the PMPY gross cost of biologics increased nearly 24%, from $10.91 to $13.48. At the same time, PUPY costs of both types of therapies have grown by 9% in biologics and over 41% in conventional DMARDs.

CONCLUSIONS: Our results show that changes in PMPY costs of these therapies are not fully explained by changes in per-utilizer costs. We observed a significant shift to biologics, as a percentage of overall utilization, as well as an increase in the overall PMPY costs of 24%, while per-utilizer costs grew only 9%. These findings suggest that an increasing number of patients are utilizing biologics in 2011 as compared with 2006. Increased use of biologics in the treatment of RA is in line with
the 2008 ACR clinical treatment guidelines. Based on the most recent 2012 ACR recommendations, as well as emerging treatment options for AR, the trend of increasing biologic use is expected to continue. Study findings support the idea that as therapies evolve, practice guidelines are refined and real-world practice follows.

**SPONSORSHIP:** This research was conducted by CVS Caremark, Northbrook, IL, without external funding.

### Units and Costs of Comparable Insulin Supplied to Patients: Is There a Difference by Manufacturer?

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**BACKGROUND:** Because the active ingredients in insulin products by Eli Lilly (LLY) and Novo Nordisk (NN) have similar pharmacokinetic/pharmacodynamic (PK/PD) profiles, patients with similar characteristics are hypothesized to require similar amounts of comparable insulin regardless of the manufacturer.

**OBJECTIVE:** To compare units per claim per day (units) and costs per claim per day (costs) of comparable LLY and NN insulin products supplied in 2011, adjusting for baseline patient characteristics.

**METHODS:** Patients with ≥ 1 claim for LLY or NN insulin in 2011 and continuous coverage for ≥ 6 months before their first insulin claim in 2011 (baseline) were identified from a privately insured claims database (N=16,000,000). Units were calculated by multiplying total quantity per claim (in mL) by strength (1 mL = 100 units) and dividing by total days supplied. Costs were calculated by dividing the cost of a claim to insurers by total days supplied. Costs were estimated separately for patients aged <65 and ≥65 years because costs to insurers for patients aged ≥65 may equal to zero due to Medicare coverage. Generalized estimating equation models, adjusting for baseline differences in patient demographics, comorbidities, endocrinologist visits, insulin pump use, antidiabetic medication use, and health plan type, were used to estimate the units and costs for comparable products.

**RESULTS:** 24,616 and 20,705 patients, respectively, had claims for comparable LLY and NN insulins in 2011. At baseline, the cohorts had similar age (58.8 years) and gender distribution (53.1% males) but significantly different profiles for comorbidities, endocrinologist visits, health plan type, and insulin pump and antidiabetic medication use. After adjusting for baseline differences, the units for all comparable LLY and NN insulins were similar, with the exception of lower units for Humulin N and Humulin R vials (table). The regression-adjusted overall cost was significantly lower for comparable LLY versus NN insulin ($7.19 vs. $10.83, P<0.001) among patients aged <65, and $5.78 vs. $6.18 ($P<0.001 among those aged ≥65) because greater shares of LLY insulin claims were for vials (70.1% vs. 55.2%) and human insulin (32.0% vs. 15.8%), which had lower costs than pens and insulin analogs, respectively.

**CONCLUSIONS:** In this analysis, patients with baseline-adjusted similar characteristics used similar amounts of comparable insulin regardless of manufacturer. The 2011 overall cost was significantly lower for comparable LLY versus NN insulin because of different product mix.

**SPONSORSHIP:** This research was conducted by Eli Lilly and Company, Indianapolis, IN, without external funding.

#### TABLE

<table>
<thead>
<tr>
<th>Number of Claims</th>
<th>Units LLY</th>
<th>Units NN</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Comparable Insulin Claims</td>
<td>81,432</td>
<td>61,057</td>
<td>0.359</td>
</tr>
<tr>
<td>By package type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pens</td>
<td>24,326</td>
<td>27,620</td>
<td>0.621</td>
</tr>
<tr>
<td>Vials</td>
<td>57,106</td>
<td>34,037</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>By comparable product</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Insulin lispro pen/insulin aspart pen</td>
<td>4,880</td>
<td>7,098</td>
<td>0.889</td>
</tr>
<tr>
<td>Insulin lispro vial/insulin aspart vial</td>
<td>3,443</td>
<td>3,507</td>
<td>0.779</td>
</tr>
<tr>
<td>Insulin lispro mix 75/25 pen/biphasic insulin aspart 70/30 pen</td>
<td>11,076</td>
<td>2,896</td>
<td>0.026</td>
</tr>
<tr>
<td>Insulin lispro mix 75/25 vial/biphasic insulin aspart 70/30 vial</td>
<td>11,076</td>
<td>2,896</td>
<td>0.026</td>
</tr>
<tr>
<td>LLY human insulin isophane vial/NN human insulin isophane vial</td>
<td>5,933</td>
<td>3,666</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LLY regular human insulin vial/NN regular human insulin vial</td>
<td>7,508</td>
<td>3,193</td>
<td>0.463</td>
</tr>
</tbody>
</table>

*Indicates significance, defined as P < 0.50.

**Use of Telaprevir Combination Treatment in Patients with Genotype 1 Chronic Hepatitis C Infection: Treatment Persistence and Early Virologic Response in a U.S. Community Setting**

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**BACKGROUND:** Telaprevir (T) in combination with peginterferon/ribavirin (PR) for 12 weeks, followed by an additional 12 or 36 weeks of PR, is approved to treat chronic genotype 1 hepatitis virus (HCV) infection in adults with compensated liver disease.

**OBJECTIVE:** To examine treatment persistence and early on-treatment virologic response in patients receiving T/PR in a community setting in the United States.

**METHODS:** Using data from a specialty pharmacy in the Mid-Atlantic region, we identified all patients who began T/PR between June 1, 2011, and May 31, 2012, and compiled available data until completion or discontinuation of treatment, data cutoff (August 21, 2012), loss to follow-up, or death, whichever occurred first. Measures of interest included discontinuation of T/PR (and reasons thereof), and on-treatment early virologic response (HCV RNA level) at weeks 4 and 12 among patients on therapy. Time to end of treatment was examined using Kaplan-Meier methods. Virologic response was examined across all patients with available data.

**RESULTS:** Study sample consisted of 1,175 patients; mean (SD) age was 52 (10) years; 61% were male; 29% were black; and 52% were treatment-naïve. Fibrosis status was unknown. Insurance was 58% private, 6% Medicare, 7% Medicaid for service, and 29% managed Medicaid. As of data cutoff, information was available for 974 patients. 224 (23%) had completed T/PR, 238 (24%) discontinued T/PR up to week 12; treatment
was ongoing for 390 patients (40%); and 4 (<1%) of patients had died. During the first 12 weeks, discontinuation rates were 69 (7%) due to futility, 144 (15%) due to side effects (primarily anemia and rash), and 25 (3%) due to noncompliance. HCV RNA levels at week 4 and week 12 are reported in the table.

CONCLUSIONS: In patients with genotype 1 chronic HCV infection receiving T/PR—many of whom were black and all with unknown fibrosis status—the incidence of treatment discontinuation by week 12 was 24%. Extended virologic response among those with available HCV RNA at week 12 was 67% in treatment-naïve patients and 59% in all treatment-experienced patients.

SPONSORSHIP: This research was conducted by Vertex Pharmaceuticals Incorporated, Cambridge, MA, without external funding.

Using a Validated Claims Data-Based Algorithm to Evaluate the Effectiveness of Self-Injected Versus Infused Biologics for Rheumatoid Arthritis Claims Data

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BACKGROUND: Administrative claims data contain large amounts of medication, diagnosis, and procedure data obtained for reimbursement purposes. These data have been used to assess safety questions, medication dosing, treatment patterns, and costs, but the absence of clinical outcome measures has limited their use in comparative effectiveness research in rheumatoid arthritis (RA). The large number of biologic agents approved for first-line use in moderate-to-severe RA and their costs make them a key area of interest for formulary decision makers. A recently published algorithm to evaluate effectiveness of biologics for RA was developed and validated against clinical outcomes like the Disease Activity Score in 28 Joints (DAS28) using administrative data from the Veterans Health Administration (VHA) linked to the VA RA registry (VARA). This validated algorithm provides a new opportunity to compare effectiveness of biologics in RA using other administrative data sources.

OBJECTIVE: To compare the effectiveness of self-injected subcutaneous (SC) biologics (adalimumab, etanercept, and golimumab) versus intravenously infused biologics (abatacept and infliximab) approved for first-line treatment of moderate-to-severe RA in patients enrolled in commercial health plans.

METHODS: Data was obtained from the IMS Lifelink Database, which comprises fully adjudicated medical and pharmaceutical claims for >70 million unique patients from 80 health plans across the United States. Biologic naïve (no claims for biologics in 6 months pre-index) adult patients with RA initiating treatment between 2007 and 2010, continuously enrolled in the same plan for ≥6 months before and 12 months after their first claim for a biologic were included. First-line biologics with <80 patients and patients with diagnoses of plaque psoriasis, psoriatic arthritis, ankylosing spondylitis, juvenile idiopathic arthritis, non-Hodgkin’s lymphoma, chronic lymphocytic leukemia, Crohn’s disease, or ulcerative colitis were excluded. The claim-based algorithm uses the following criteria to determine lack of effectiveness: low adherence to medication (medication possession ratio [MPR] <80%) or receiving <expected number of infusions), increase in biologic dose or frequency, switching biologics, adding new nonbiologic disease-modifying anti-rheumatic drugs (e.g., leflunomide), new use of glucocorticoids or an increase in glucocorticoid dose, and >1 parenteral or intra-articular injection. Multivariate analyses to control for differences at baseline were not conducted.

RESULTS: Patients taking infused (n = 2,108) versus SC biologics (n = 6,405) were older (median age 53.0 vs. 51.0; P < 0.001). A similar proportion were female (77.7% versus 76.8%; P = 0.368). Infliximab was the most commonly used infused agent (67.5%) versus abatacept (32.9%). SC biologics included etanercept (58.7%), adalimumab (40.0%), and golimumab (1.3%). Infused agents were effective in a smaller proportion of patients than SC agents (22.0% vs. 28.6%; P < 0.001). Among infused agents, infliximab was effective in a lower proportion of patients than abatacept (18.8% vs. 26.8%; P = 0.001). Among SC products, etanercept, adalimumab, and golimumab were effective in 29.9%, 26.7%, and 32.9%, respectively: P = 0.006 etanercept versus adalimumab and P = 0.548 etanercept versus golimumab.

CONCLUSIONS: SC biologics were rated as effective in a higher proportion of patients than infused biologics using the algorithm; however, there was substantial heterogeneity between infused products.

SPONSORSHIP: This research was funded by Immunex Corporation, a wholly owned subsidiary of Amgen Inc., and by Wyeth, which was acquired by Pfizer Inc. in October 2009, Thousand Oaks, CA.

Using Natural Language Processing to Identify Gout Flares and Evaluating Factors Associated with Refractory Chronic Gout Patients in a Managed Care Organization

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BACKGROUND: Refractory chronic gout (RCG) patients have frequent flares and are associated with increased health care resource use, economic burden, and have a decrease in quality of life. Unfortunately, gout flares are not adequately captured using ICD-9-CM codes. Natural language processing (NLP) offers the potential to identify patients with acute gout flares using a validated, automated, and multidisciplinary technology to extract valuable information from unstructured "free text" in electronic health chart notes.
OBJECTIVE: To identify patients with RCG using multidisciplinary technology and evaluate factors associated with RCG patients in an integrated health system.

METHODS: Patients aged 18 years and older with diagnosis of gout (ICD-9-CM 274.xx) and on urate-lowering therapy (ULT) from January 1, 2007, to December 31, 2010, were identified within Kaiser Permanente Southern California (KPSC). An algorithm containing an extensive list of key words, text phrases, and other search words associated with gout flares was created in collaboration with an NLP specialist and KPSC rheumatologists. RCG patients were defined as patients with ≥3 gout flares during 12 months of follow-up. Baseline comparisons were made between RCG and non-RCG patients using descriptive statistics. A multivariable logistic regression model was used to evaluate characteristics such as age, gender, race, comorbid conditions, concomitant medications, adherence, prescriber care, and ULT dose adjustment associated with RCG patients.

RESULTS: Of 16,707 gout patients, electronic chart notes were available for 16,519 patients (99%). The mean age was 62 years, and 80% were male. The common comorbid conditions were hypertension (73%), dyslipidemia (59%), diabetes (25%), and renal disease (25%). Over 70% of patients were seen by a primary care physician (PCP) and were prescribed their initial ULT from a PCP. NLP identified 511 patients with RCG with mean serum urate acid (sUA) level of 9.3 mg/dL versus 8.1 mg/dL in non-RCG patients. Following are factors that were found to be statistically significant between the 2 groups: female patients were 23% less likely to be RCG (OR=0.77, 95% CI 0.59-1.01); patients at sUA goal (<6mg/dL) were 69% less likely to be RCG (OR=0.31, 95% CI 0.17-0.56); patients with renal disease (OR=2.03, 95% CI 1.58-2.59) and obese patients were more likely to be RCG (OR=2.04, 95% CI 1.60-2.60); Patients with RCG were more likely to be taking colchicine (OR=2.00, 95% CI 1.61-2.48) and corticosteroids (OR=1.12, 95% CI 0.90-1.40), and RCG patients were more likely to have an increase in their ULT dose (OR=2.27, 95% CI 1.65-3.14).

CONCLUSIONS: NLP is a new, innovative, validated field of computer science and linguistics that can be used to identify and extract valuable information within EHR “free text” chart notes. We identified RCG patients using NLP and identified factors that may contribute to lack of disease control. These factors included failure to achieve sUA level goals, renal disease, greater need for rescue medications (colchicine, corticosteroids), and poor adherence. NLP proved to be a valuable tool and allowed us to identify and characterize RCG patients within an integrated system.

SPONSORSHIP: This research was funded by Savient Pharmaceuticals, Inc., Bridgewater, NJ.

Utilization of Infliximab in the Treatment of Rheumatoid Arthritis in an Ambulatory Care Network in Northern California

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BACKGROUND: Infliximab is a tumor necrosis factor alpha inhibitor approved by the FDA for treatment of rheumatoid arthritis (RA). Demonstration of the “real-world” weight-based utilization patterns of this agent is limited. An understanding of the current usage patterns of infliximab in the treatment of RA is essential to optimizing the management of patients.

OBJECTIVE: To describe the utilization of infliximab in the treatment of RA in an ambulatory care network in Northern California.

METHODS: Patients with an ICD-9-CM diagnosis of RA (714.xx) were retrospectively identified in the electronic health record (EHR) of Sutter Health’s ambulatory network between January 1, 2007, and June 30, 2011 (index period). Adult RA patients (aged ≥18 years) with ≥1 infliximab infusions were included in this analysis, comprising both prevalent and incident users. Patients receiving another biologic agent within 30 days of an infliximab infusion were excluded. Demographics, characteristics, and infliximab dosing and frequency were collected from the EHR. Weight-based dose was calculated by dividing the prescribed dose by the most recent weight recorded in the EHR. Dose changes were defined as an increase or decrease in ≥1 vials used, and infusion frequency changes were defined as a prescribed increase or decrease by ≥1 weeks as compared with the previous infusion. Descriptive statistics were used to summarize study variables. As an exploratory analysis, data were stratified by payer type.

RESULTS: A total of 125 patients with RA were identified. On average, patients were aged 60 years (range 18-90 years); the majority were female (82%), and 65% were concurrently taking methotrexate. Approximately half of the patients were Medicare beneficiaries (53%), and 44% were commercial beneficiaries; the remaining patients were uninsured or had “other” insurance. Patients received infliximab over a mean of 27.4 months at an average prescribed dose of 347.2 mg (range 100 to 875 mg), corresponding to a mean weight-based dose of 4.8 mg/kg (range 2.51-11.67 mg/kg). Weight-based doses increased from 4.5 mg/kg at the beginning of the index period to 5.0 mg/kg at the end of the index period. Among 125 RA patients, a total 2,608 infliximab infusions were administered during the study period. Dose increases and decreases occurred in 1.6% and 0.2% of infusions, respectively. The median infusion frequency was 8 weeks (range 2 to 13 weeks). Frequency increases and decreases occurred in 1.8% and 1.5% of infusions, respectively. Medicare beneficiaries were, on average, older than commercial beneficiaries (68.6 vs. 51.3 years) and were less likely to have received prior biologic therapy (91.6% vs. 36.4%). Infliximab dosing (mean: 5.0 and 4.5 mg/kg, respectively) and infusion frequency (mean: 8 weeks, for each) were similar for Medicare and commercial beneficiaries.

CONCLUSIONS: In this California ambulatory care network, RA patients were maintained on infliximab for an average of 2.3 years with a median infusion frequency of every 8 weeks. The mean weight-based dose of infliximab was within the range suggested in the approved product labeling. Changes to infliximab dosage or dosing frequency were rare, and there was little variation in the average weight-based dose administered over the study duration.

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Utilization of Infliximab in the Treatment of Inflammatory Bowel Disease in an Ambulatory Care Network in Northern California

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BACKGROUND: Infliximab is a tumor necrosis factor alpha inhibitor approved by the FDA for multiple indications including the treatment of ulcerative colitis (UC) and Crohn’s disease (CD), which together comprise inflammatory bowel disease (IBD). Demonstration of the “real-world” weight-based utilization of infliximab is limited. An understanding of current infliximab utilization patterns in the treatment of patients with UC and CD is essential to optimizing the management of patients.
OBJECTIVE: To describe the weight-based utilization of infliximab in the treatment of UC and CD in a large ambulatory care network in Northern California.

METHODS: Patients with an ICD-9-CM diagnosis of UC (556.xx) or CD (555.xx) were retrospectively identified in the electronic health record (EHR) between January 1, 2007, and June 30, 2011 (index period). Adult UC and CD patients (≥ 18 years of age) with ≥ 1 infliximab infusions were included in this analysis, comprising both prevalent and incident users. Patients with a concomitant biologic agent used within 30 days of an infliximab infusion were excluded. Demographics, characteristics, and infliximab dose and frequency were collected from the EHR. Weight-based dose was calculated by dividing the prescribed dose by the most recent weight recorded in the EHR. Dose changes were defined as an increase or decrease in ≥ 1 vial and infusion frequency changes were defined as a prescribed increase or decrease by ≥ 1 week as compared with the previous infusion. Descriptive statistics were used to summarize study variables for the combined population and for patients with UC and CD.

RESULTS: A total of 143 patients with IBD were identified (54.5% with UC and 45.5% with CD). On average, patients were aged 40 years (range 18 to 81 years), and 52% were female. The majority of patients were commercially insured beneficiaries (92%). Patients received infliximab over a mean of 18.5 months at an average prescribed dose of 452.9 mg (range 200 mg to 1,000 mg), corresponding to a mean weight-based dose of 6.0 mg/kg (range 3.7 to 10.6 mg/kg). Weight-based dose increased from 5.7 mg/kg at the beginning of the index period to 6.4 mg/kg at the end of the index period. A total of 1,681 infliximab infusions were administered among 143 IBD patients during the study period. Dose increases and decreases occurred in 2.2% and 0.3% of infusions, respectively. The median infusion frequency was 8 weeks (range 2 to 12 weeks). Frequency increases and decreases occurred in 2.0% and 0.9% of infusions, respectively. UC and CD patients were similar in terms of baseline demographics and characteristics, as well as average infliximab dosing (mean: 5.9 and 6.1 mg/kg, respectively) and infusion frequency (median: 8 weeks, for each).

CONCLUSIONS: In this large California ambulatory care network, IBD patients were maintained on infliximab for an average of 18 months with a median infusion interval of every 8 weeks. Changes to infliximab dosage or dosing frequency were rare, and there was little variation in the average weight-based dose administered over the study duration.

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