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Using SAS® to Evaluate Patient-Directed Quality of Care Interventions

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ABSTRACT

Health plans use wide-ranging interventions based on criteria set by nationally recognized organizations (e.g., NCQA, CMS) to change health-related behavior in large populations. Evaluation of these interventions has become more important with the increased need to report patient-centered quality of care outcomes. Findings from evaluations can detect successful intervention elements and identify at-risk patients for further targeted interventions. This paper describes how SAS® was applied to evaluate the effectiveness of a patient-directed intervention designed to increase medication adherence and a health plan's CMS Part D Star Ratings. Topics covered include querying data warehouse tables, merging pharmacy and eligibility claims, manipulating data to create outcome variables, and running statistical tests to measure pre-post intervention differences.

INTRODUCTION

This paper begins with a brief background on quality improvement and describes a few of the major organizations dedicated to quality and their associated performance measurement programs. This is followed by a brief explanation of the CMS Star Ratings program and a description of how health plans use broad, brief interventions to increase performance measures. The second half of the paper walks through an example of how SAS was used to evaluate a patient-directed medication adherence intervention aimed to improve patient medication adherence and a health plan's quality performance ratings.

QUAILTY IMPROVEMENT

Although high quality has always been a health care delivery goal, government reports and legislation in the last decade has increased the demand to demonstrate quality improvement. The 2001 Institute of Medicine report, "Crossing the Quality Chasm", calls for better quality of care that is safer, timelier, more consistent and more equitable. The Patient Protection and Affordable Care Act (ACA) of 2010 mandates the use of performance measures on the quality of care, public reporting, and performance payments. Quality measures, or performance measures, are often used to evaluate how well healthcare services are delivered. Performance measures are usually a derived from technical specifications developed by experts. A measure will describe a metric or outcomes as indicators of quality. Much like a physician would treat a disease, quality improvement efforts can be used to diagnosis areas of poor performance, treat the area with a QI intervention and track performance over time to assess improvement and identify areas for further improvement. Health plans required to meet standards of care can use performance measurement to demonstrate quality improvement and patient-centered outcomes. In his article published in Health Services Research, Scalon states that "health plans use performance measures to target quality-improvement initiatives, evaluate current performance, establish goals for quality improvement, identify the root cause of problems, and monitor performance."

ORGANIZATIONS DRIVING QUALITY IMPROVEMENT

Table 1 lists major quality organizations that continually provide standards and develop quality care measures. The National Committee for Quality Assurance (NCQA) improves health care quality by offering their Healthcare Effectiveness Data and Information Set (HEDIS) tool for health plans to measure performance on 75 measures across 8 domains of care. The National Quality Forum (NQF) operates under the mission of endorsing national standards for measuring and public reporting of performance. The Agency for Healthcare Research and Quality (AHRQ) maintains the Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys that ask consumers and patients to report health care experiences ranging from provider skills to access of care. The Pharmacy Quality Alliance (PQA) is a non-profit alliance of over 100 member organizations that collaborate to promote appropriate medication use. The Centers for Medicare and Medicaid Services (CMS) measures and reports Medicare health plan quality through a Star Ratings program that allows beneficiaries to compare quality of available health plans.

Organization	Quality Improvement Area
National Committee for Quality Assurance (NCQA)	Health system performance measurement HEDIS = 75 measures across 8 domains of care

National Quality Forum (NQF)	Sets quality standards, recommends measures
Consumer Assessment of Healthcare Providers and Systems (CAHPS)	Survey consumers and patients on access and treatment
Pharmacy Quality Alliance (PQA)	Promotes appropriate medication use Develops medication-related performance measures
Centers for Medicare and Medicaid Services (CMS)	Medicare Health & Drug Plan Quality and Performance Ratings or "Star Ratings Program"

Table 1. Select Organizations Driving Quality Improvement

CMS Medicare Health & Drug Plan Quality and Performance Ratings

The CMS Health and Drug Plan Quality Performance Ratings Program (Star Ratings Program) is a quality program developed to support improvement in 4 areas: beneficiary outcomes, satisfaction, population health and efficiency of care delivery (Figure 1). The Star Ratings Program ranks Medicare contracts by quality of care across 51 performance measures (Part C and Part D measures). Plans receive an overall star between 1 and 5 (5 = highest) every year which is published on the Medicare Plan Finder website. Medicare beneficiaries are able to use this information when deciding on competing plans. These Star Ratings are released each fall before the open enrollment period (Oct.15th –Dec. 7th) for 33.7 million beneficiaries.

The benefits of high ratings include potential quality bonus payments and greater rebate percentage based on membership size and geographical location, public display of ratings on the Medicare Plan Finder website and the ability to enroll members outside of the customary enrollment period.

Figure 1. CMS Star Ratings Program

Health Plan Approach to Improving Quality Performance

As an approach to improving quality of care and subsequently ratings, many health plans have increased the use of broad member-directed or provider-directed interventions. This is a common approach because health plans can leverage data to implement interventions across entire populations using fewer resources. Smaller complex targeted interventions, although shown to be effective in clinical trials, can be challenging to implement in routine clinical care and difficult to scale in large populations. Plans often use or find pieces of interventions to satisfy part of a quality

measure or use existing infrastructure or existing programs to satisfy an area or deliver a message with aims of increasing the metric. Examples of measures include appropriate use of asthma controller medications, inappropriate use of high risk medication, or increase adherence to chronic medications.

Interventions are often implemented as a series of program components where health plans assess how one component performed and then add, or augment a component. In this case, assessment of the intervention requires measuring a baseline period, post-implementation period of the first component and a post-intervention period of second component to assess add-on effect of second component. Here the first component serves as baseline period for second component. Additionally, health plans may have similar interventions in place or previously implemented ineffective interventions. Knowing the details (e.g., who was contacted, how many times, target audience) of previous or current programs is necessary to assess incremental or combination intervention effects.

USING SAS TO EVALUATE HEALTH PLAN INTERVENTIONS

A variety of SAS capabilities and modules can be used to evaluate interventions. These include;

- Querying data warehouses.
- Linking databases (e.g., member, pharmacy, medical claims).
- Creating new variables.
- Applying methods (e.g., pre-post period analyses, difference in difference, instrumental variable, propensity scoring) and conducting statistical tests.
- Visualizing data with simple graphs or complex data visualization packages.
- Exporting results via multiple destinations.

Evaluations of interventions can be useful for a number of reasons because they are able to,

1. Identify successful intervention components. This answers the question of what worked (e.g., mailing or phone call).
2. Profile responders and target subgroups for further invention. That is, for whom did the intervention work and for whom did it not work.
3. Identify patient risk factors driving performance (poor or good).
4. Monitor and forecast performance.
5. Increase patient-centered outcomes research (PCOR).

CASE STUDY: EVALUATION OF A MEMBER-DIRECTED MEDICATION ADHERENCE INTERVENTION

This section of the paper focuses on how SAS was used to conduct an evaluation of intervention aimed to increase medication adherence among Medicare beneficiaries. Included are examples of querying data warehouse tables, merging pharmacy claims and drug information tables, manipulating data to create outcome variables, and running statistical tests to measure pre-post intervention differences. Specifically, analysis of covariance was used to evaluate post-implementation period adherence differences while adjusting for baseline adherence and patient characteristics. PROC TABULATE was used to create a typical “Table 1”.

The research was presented in both podium and poster formats at the Academy of Managed Care Pharmacy 25th Annual Meeting and Expo last April 3-5, 2013. The poster is on the last page of this document.

First, the significance of medication adherence and the most common measurement method is given as a background. This is followed by examples of using SAS to conduct steps of the evaluation.

MEDICATION ADHERENCE SIGNIFICANCE

The Medication and Compliance Special Interest Group of ISPOR, the International Society for Pharmacoeconomics and Outcomes Research defines adherence as ”the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen” (Cramer, 2007). Put another way, medication adherence is how well people follow prescribed doses of medication.

Non-adherence to medication is a pandemic problem that varies by study population and therapeutic class. The World Health Organization estimates adherence to long-term therapy for chronic diseases at 50% in developed countries and categorizes potential reasons for non-adherence into 5 groups; patient, disease state, health system, therapy and socioeconomic (De Geest, 2003). The consequences of non-adherence include unnecessary morbidity and mortality, lost quality of life, and costs estimated at $177 billion per year (Ernst, 2007).

CMS developed their Plan Star Ratings Program to measure health plan performance and allow beneficiaries to compare cost and quality of available Medicare Advantage Prescription Drug (MAPD) plans and Prescription Drug Plans (PDPs). CMS recognized poor adherence as a major public health problem and placed more importance on measures related to adherence. Of the 15 total Part D measures, the three Patient Safety Measures; Medication Adherence for Oral Diabetes Medications (D13), Medication Adherence for Hypertension (D14), and Medication Adherence for Cholesterol (D15) carry triple the weight of other measures and therefore can contribute 11.7% of a plan's overall Star Rating and 31% of its Part D rating.

ADHERENCE ESTIMATED BY PROPORTION OF DAYS COVERED

The most common measurement method of medication adherence is Proportion of Days Covered (PDC). Basically this observational, indirect method uses pharmacy claims to calculate the days a person is covered by medication. There are limitations with this measurement method, namely, observed adherence may differ from actual adherence, but this is the preferred method endorsed by the CMS, NCQA, and the Pharmacy Quality Alliance (PQA).

Below is a graphical representation of a patient's prescription claim history (Figure 2). Medication coverage in a measurement period can be estimated by using date of fill and days' supply data fields. The measurement period can be cross-sectional, which is the method used by CMS in their Part D Star Ratings adherence measures or longitudinal by following patients for similar lengths of time. This example shows 11 prescription claims for the patient, with claim 7 being shifted forward by the number of overlapping days of Claim 6 and claim 11 filled during measurement period with days' supply carrying outside the measurement period. PDC is the proportion of days covered to days reviewed. The first fill date is the beginning of a patient's review period. The date of disenrollment or end of measurement period is end of a patient's review period. In this example days of review is from 1/11/2011 to 12/31/2011, and days of coverage is 320 days. Therefore 320 days covered / 355 days reviewed yields a PDC of 90.1%, considered good adherence based on the most commonly used threshold (≥ 80%).

My paper entitled "Using Arrays to Calculate Medication Utilization", presented at the 2007 SAS Global Forum, shows how arrays can calculate PDC by identifying medication coverage for all days in a review period. An extension of this code is described in my paper presented at the 2013 Western Users of SAS Software conference with code included in the Appendix. In this example the study design is cross-sectional and patient adherence is estimated for a calendar year.

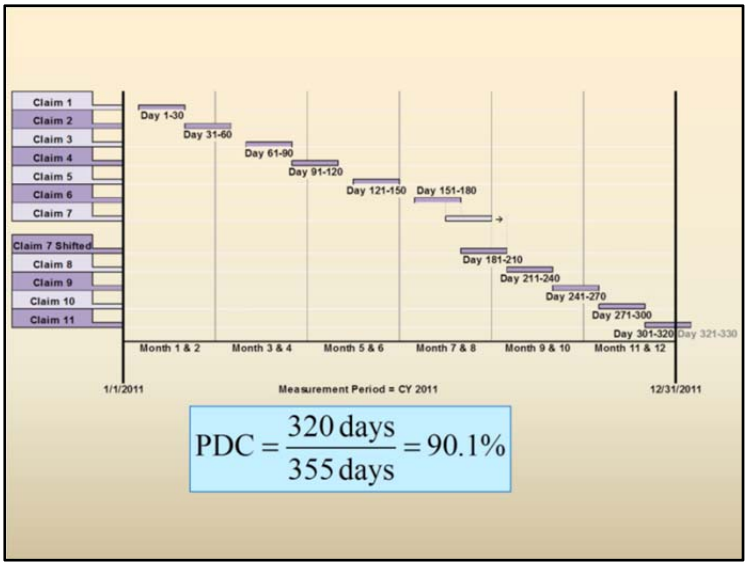


Figure 2. Estimating Adherence via Proportion of Days Covered (PDC)

INTERVENTION BACKGROUND

*i*Care, Independent Care Health Plan, is a health plan in Milwaukee, Wisconsin that serves dual-eligible (Medicare and Medicaid) members. They are a SNP, or special needs plan, with all members receiving financial subsidies for care. They received the lowest Star Rating (1 Star) in each of the three adherence Patient Safety measures for the 2010 and 2011 measurement years. Previous intervention attempts to increase members' adherence to medications were unsuccessful due to *i*Care's small care management team. So MedImpact and *i*Care collaborated with US MED, a mail order pharmacy, to design a member-directed adherence intervention with the purpose of engaging patients and improving quality of care which would subsequently increase *i*Care's 3 adherence-based Star Ratings. Findings would demonstrate how health plans, pharmacies and PBMs can collaborate to offer novel methods for improving patient medication adherence among a population previously demonstrating poor medication adherence.

The intervention consisted of monthly analysis of pharmacy claims to identify members for intervention (Figure 3). Data files listing member adherence information were formatted and loaded into *i*Care's care management system where care coordinators called identified members to counsel them on the importance of medication adherence and offer enrollment in a mail order pharmacy program (US MED). A web-based application allowed real-time communications between *i*Care care coordinators and the pharmacy's customer service team to facilitate beneficiary enrollment and maintain beneficiary care.

The objectives of the evaluation were to assess the intervention effectiveness and estimate the overall impact on long-term adherence to the three medication classes. Member adherence rates were calculated pre- and post-implementation for all members and adjusted by length of member enrollment based on CMS technical specifications. Regression analysis assessed pre-post changes in rates by intervention group, *i*Care-only and *i*Care+US MED groups. To evaluate the overall impact of the intervention, the health plans' adherence rates and Star Ratings for the last two calendar years (CMS measurement years) were compared to the national MAPD contract average and to a comparator contract, a health plan similar in member characteristics but one that did not receive the adherence intervention exposure.

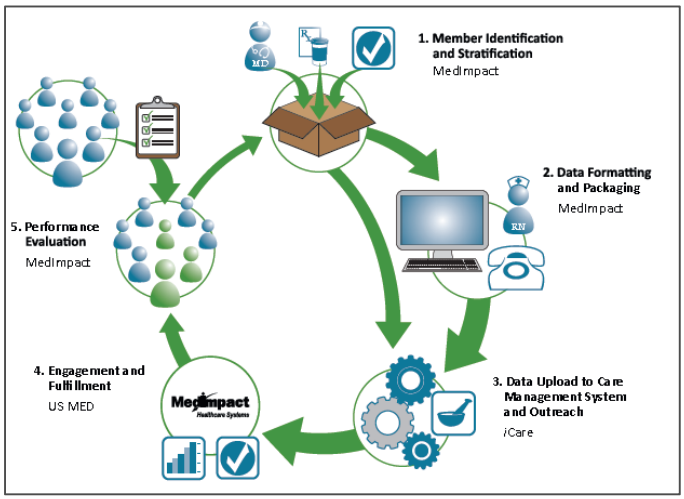


Figure 3. Intervention Process Flow

Using PROC SQL to download data

Pharmacy claims were downloaded to identify members for the evaluation and calculate outcomes. With SAS/ACESS you can connect to a database management system (DBMS) using the SQL Procedure Pass-Through Facility which allows sending SQL code to a DBMS. The code below demonstrates how to connect and disconnect to an Oracle data warehouse using CONNECT statement and DISCONNECT statements.

The pass-through facility statements are used in a query that joins two tables (pharmacy claims and drug information tables) to download specific data elements during a specified time period.

```
proc sql;
        connect to oracle as asd
                (user=xxx password=xxx buffsize=1000 path='xxx');
        create table pdata.dwnld_clms as
                select *
                        from connection to asd
```

```
                                (select
                                       a.member_id, a.claim_id, a.drug_id,
                                       a.fill_dt, a.days_supply, a.qty_supply,
                                       b.ndc,
                                       substr(b.generic_name,1,100) as generic_name,
                                       b.brand_name,
                                       c.pharmacy_id, c.pharmacy_name,
                                       c.store_no, c.addr_line_1 as phrmcy_addr_line_1
                                       c.city as phrmcy_city, c.state_cd as phrmcy_state_cd

                                from md_claim a,
                                       md_drug b,
                                       md_pharmacy c

                                where a.drug_id = b.drug_id
                                and a.pharmacy_id = c.pharmacy_id
                                and a.fill_dt between to_date ('01-JAN-2013', 'dd-mon-yyyy')
                                                and to_date ('31-MAR-2013', 'dd-mon-yyyy')
                                );
        %put &sqlxmsg;
        disconnect from asd;
quit;
```

Creating a "Table 1" Using PROC TABULATE

PROC TABULATE was used to create a "Table 1" that describes patient characteristics of the study population. The code below takes advantage of formats to display variable names into comprehensible names (e.g., DM = "Diabetes"). Notice also the indicator female variable was be formatted to give a percentage by taking the mean of the variable's values.

```
proc format;picture pct 0-100=009.0% (mult=1000);run;
proc format;
value yesno
1='Yes'
0='No';
run;
proc tabulate data=icohort missing order=formatted;
       class agegrp measure flag_newstart;
       var age female;

       table N='Patient Count'*f=comma8.
              (female='Female')*(mean='%')*f=pct.

              (age='Age')*(mean std='SD')*f=4.1
              (agegrp='Age Group' flag_newstart='New to therapy')*colpctn='%'*f=4.1
              ,
              measure=' ' all='TOTAL';
              format measure $msr. agegrp aggrpq. flag_newstart yesno.;
run;
```

		Diabetes	Hypertension	Statin	TOTAL
Patient Count		659	1,538	503	2,700
Female	%	67.3%	62.8%	63.0%	63.9%
Age	Mean	60.7	60.6	59.9	60.5
	SD	12.3	12.9	13.1	12.8
Age Group					
55-64	%	27.8	27.4	25.6	27.1
65-74	%	29.3	27.2	24.7	27.2
75+	%	12.1	13.7	13.9	13.4
< 54	%	30.8	31.7	35.8	32.3
New to Therapy					
No	%	82.2	81.5	78.3	81.1
Yes	%	17.8	18.5	21.7	18.9

Output 1. Output from PROC TABULATE

Reporting odds ratios using PROC LOGISTIC and ODS Graphics

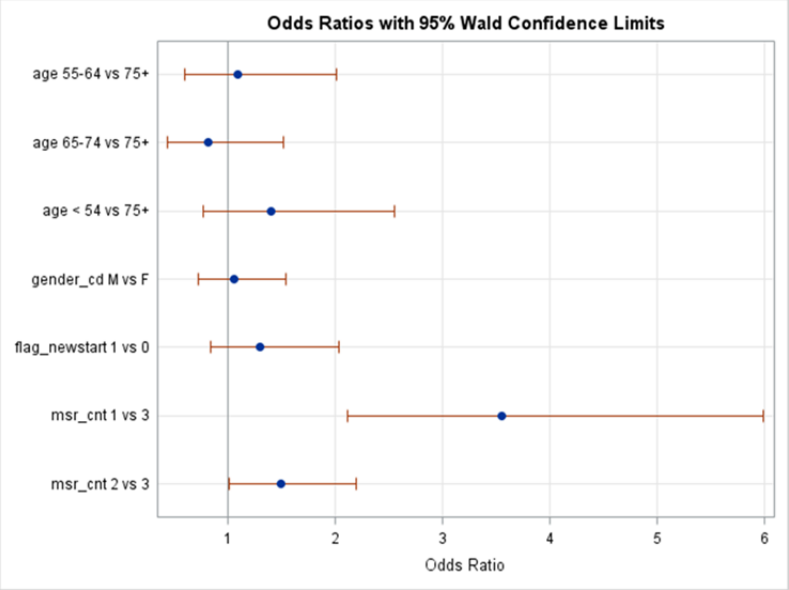
Odds ratios can be displayed in a plot (vs. a table) which helps with explanations. Similar to the example above, PROC LOGISTIC was used to obtain odds ratios to create a table of adjusted outcomes. In this example the objective was to identify risk factors of poor adherence.

In the code below, odds ratios are computed for the independent variables listed in the MODEL statement. The EVENT option in the MODEL statement requests to model the probability of members being non-adherent. The REF option in the CLASS statement sets the reference category for each of the specified variables (e.g., compare the probability of non-adherence for males vs. females). Other options in the MODEL statement call for the generalized R^2 for the fitted model and 95% Wald confidence limits for the odds ratios. The FORMAT statement is used to format a few independent variables. To get an odds ratio plot turn on ODS Graphics and use the PLOTS option.

```
ods graphics on;

proc logistic data=pdata.icohort plots=oddsratio;
      where msr_dm=1;
      class gender_cd (ref='F')flag_newstart (ref='0') msr_cnt (ref='3') age
(ref='75+') medicaidrx_sum (ref='<4')/ param=ref;
      model flag_pdc_db_oral (event='0')= age gender_cd flag_newstart msr_cnt
            /rsquare clodds=wald clodds=pl lackfit;
      format age aggrpq. medicaidrx_sum med2rxcat.;
run;
```

The resulting output includes a plot of the odds ratios and 95% Wald confidence limits for each independent variable. In this case, members that were identified by one measure were more than 3 times as likely to be non-adherent compared to members identified by 3 measures. The other independent variables did not demonstrate much association while controlling for the variables in the MODEL statement.



Output 2. Output from PROC LOGISTIC

Estimating Least-squares Means Using PROC GLM

The member-level analysis objective in this study was to compare adherence rates by the 2 groups Comparing unadjusted means is easily done with PROC MEANS or PROC TTEST, but to get adjusted means requires the GLM procedure to control for believed confounding factors. Here PROC GLM was used to create a typical “Table 3” that reports adjusted outcomes. The LSMEANS statement in PROC GLM computes the least-squares means and performs multiple comparisons of means when specifying certain options.

In this case desired outputs include adjusted means using least-squares, multiple comparisons of pairwise differences, and the *p*-values to show if differences between means are statistically significant. The least-squares means are computed for the group variable listed in the LSMEANS statement. The ADJUST statement requests a

multiple comparison adjustment using the Tukey-Kramer method. Other options in the LSMEANS statement call for the *p*-values and confidence limits for the multiple comparisons of pairwise differences of the least-squares means. PDIFF requests that *p*-values for differences of the LS-means be produced. The resulting output is the adjusted mean and a statistical test to compare significant differences in the means (Output 3).

```
proc glm data=ptids_eval;
class usmed gender_cd;
  model pdc_pct = usmed gender_cd pdc_pct_pre
/solution;
  lsmeans usmed/OM ADJUST=TUKEY PDIFF CL;
where measure='ORAL DIABETES';
quit;
```

The GLM Procedure
Least Squares Means
Adjustment for Multiple Comparisons: Tukey-Kramer

usmed	pdc_pct LSMEAN	H0:LSMean1=LSMean2 Pr > |t|
0	85.4778051	<.0001
1	93.3241391	

usmed	pdc_pct LSMEAN	95% Confidence Limits	
0	85.477805	84.008702	86.946909
1	93.324139	91.466567	95.181711

Least Squares Means for Effect usmed

i	j	Difference Between Means	Simultaneous 95% Confidence Limits for LSMean(i)-LSMean(j)	
1	2	-7.846334	-10.227403	-5.465265

Output 3. Output from PROC GLM

CONCLUSION

Health plans often use broad, brief interventions to address requirements and increase quality of care performance. The multiple capabilities and modules of SAS can be employed to evaluate such interventions as part of a larger goal of continuous quality improvement. Available techniques using SAS capabilities include querying data warehouses, creating variables, measuring outcomes, deriving variables, performing several statistical methods and displaying results.

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We would like to acknowledge Breanne Tirado, pharmacy director of *i*Care (Independent Care Health Plan), for permitting the use of the *i*Care case study as the example in this paper and presentation.

RECOMMENDED READING

- *Getting Started with SAS Enterprise Guide – free learning tutorial available at http://support.sas.com/documentation/onlinedoc/guide/tut42/en/menu.htm*
- *Tricia Aanderud's Enterprise Guide page, http://www.bi-notes.com/sas-enterprise-guide/*

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sascommunity.org: http://www.sascommunity.org/wiki/Presentations:Rsleslie_Papers_and_Presentations

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Evaluation of a Member-Directed Part D Medication Adherence Intervention

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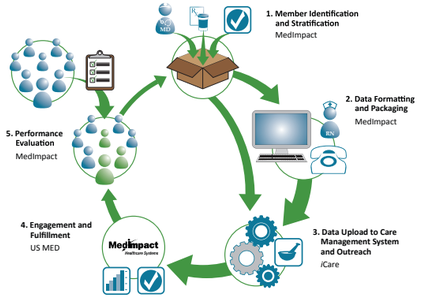
Background:

- The World Health Organization estimates adherence to long-term therapy for chronic diseases at 50% in developed countries.[1] The consequences of nonadherence include unnecessary morbidity and mortality, lost quality of life, and costs estimated at $177 billion per year.[2]
- The Centers for Medicare and Medicaid Services (CMS) Part D Star Ratings Program measures plan performance allowing beneficiaries to compare the quality of available Medicare Advantage Prescription Drug (MAPD) plans.
  - Three Part D Patient Safety Measures; Medication Adherence for Oral Diabetes Medications (ODM/D16), Medication Adherence for Hypertension (RAS antagonists/D17), and Medication Adherence for Cholesterol (statins/D18) carry triple the weight[3] of other measures and therefore contributes to 11.7% of a plan's overall Star Rating and 31% of its Part D rating.
- Prescription drug plans have increased resources to existing care management interventions as an approach to improving member medication adherence and subsequently plan adherence.
- MedImpact Healthcare Systems, Inc., a pharmacy benefits manager, *i*Care, a MAPD plan with a dual-eligible special needs population, and US MED, a mail order pharmacy, partnered to engage and enroll members of a dual-eligible special needs population in a program designed to improve quality of care and member adherence to each of the 3 medication adherence Part D Patient Safety measures.
  - *i*Care received a 1 Star Rating for each of the 3 medication adherence measures for the 2010 and 2011 measurement years (CY2012 and CY2013 Star Rating Years, respectively).

Objectives:

- To implement and assess effectiveness of a coordinated medication adherence intervention.
- To determine and estimate the overall impact on long-term adherence.

Figure 1. Program Process Flow



Methods:

Program Description

- A coordinated medication adherence intervention utilized existing care management infrastructure to create a patient-focused program for beneficiaries taking medications in the three target therapeutic classes.
- Monthly analysis of pharmacy claims identified beneficiaries non-adherent to therapy as calculated by the Proportion of Days Covered (PDC < 80%).
- Additional risk factors were assessed based on beneficiaries with multiple adherence issues, newly-started versus continuation drug therapy and most recent 6-month adherence levels.
- Data files listing beneficiary adherence information were formatted and loaded into *i*Care's care management system where care coordinators counseled beneficiaries on the importance of adherence and options for medication home delivery *(Figure 1)*.
- Care coordinators from *i*Care's care management department received monthly alerts in the form of a "task" which triggered them to make a call to their beneficiary to address medication non-adherence and referred beneficiaries to US MED to receive enrollment materials.
- Beneficiaries received an option for regular home deliveries of 30-day supplies of maintenance medications. Outreach from US MED included a detailed educational program and enrollment kits, consisting of a co-branded introductory letter from the plan and pharmacy and a printed application.
- An online member referral application allowed real-time communications between *i*Care care coordinators and the pharmacy's customer service team to facilitate beneficiary enrollment, beneficiary status and issue resolution.

Study Design

- Retrospective analysis using administrative pharmacy claims and membership eligibility data from the MedImpact database.
  - Beneficiaries identified for intervention were followed during a 9-month post-implementation period to evaluate outcomes.
  - Calendar year performance periods were observed using CMS published rates.

Outcomes

Program performance was assessed by the following measures:

- **Enrollment Rates** – Number of beneficiaries contacted and enrolled were calculated.
- **Adherence Rates** – Methods used the Proportion of Days Covered (PDC) as described in CMS Medicare Health & Drug Plan Quality and Performance Ratings 2013 Part C & Part D Technical Notes[3] (latest version released 10/10/2012) and Pharmacy Quality Alliance Technical Specifications.[4]
  - Beneficiaries with at least 2 claims for the target medication class and aged 18 at time of first claim in measurement year.
  - PDC measured in days from first claim in period to end of measurement period or disenrollment.
  - Member-years were calculated as number of days enrolled divided by days eligible in measurement period.
    - Changes in rates for US MED participants (enrollees) and non-participants (non-enrollees) were compared.
    - Rates in the post-intervention period were compared for the 6 highest pharmacy chains based on utilization volume.

Statistical Methods

- Multivariate linear regression models were fitted to assess significant changes in adherence rates pre- and post-implementation by enrollees and non-enrollees.

Table 1: Member Demographics and Adherence Change by Measure and Enrollment Status

	D16: Oral Diabetes			D17: Hypertension			D18: Cholesterol		
	Enrollees n = 210	Non-Enrollees n = 334	*P*-value	Enrollees n = 486	Non-Enrollees n = 1167	*P*-value	Enrollees n = 454	Non-Enrollees n = 1036	*P*-value
Age, mean	60.0	61.8	0.0675	60.7	60.9	0.8751	61.8	61.8	0.9365
Female, %	74.8	64.1	0.0091	70.8	62.2	0.0009	70.3	62.3	0.0029
Baseline PDC, mean	79.6	83.8	0.0237	82.1	85.1	0.0038	79.0	83.8	<.0001
Post PDC, mean	92.3	86.1	<.0001	91.3	83.7	<.0001	90.2	84.1	<.0001
Change PDC (Post –Pre), mean	+12.7	+2.3	<.0001	+9.1	-1.3	<.0001	+11.3	+0.29	<.0001
Adjusted Mean Difference[a] (Post-Pre)	**+7.8**		**<.0001**	**+8.8**		**<.0001**	**+7.7**		**<.0001**

Figure 2. New Member Enrollment by Month

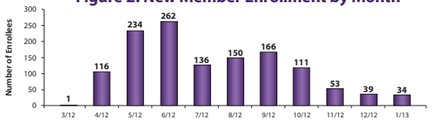


Figure 3a: Oral Diabetes Adherence in 9-Month Post Period by Pharmacy Chain

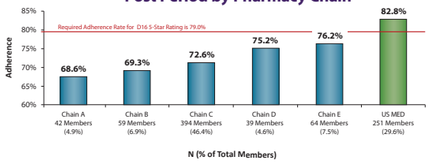


Figure 3b: Hypertension Adherence in 9-Month Post Period by Pharmacy Chain

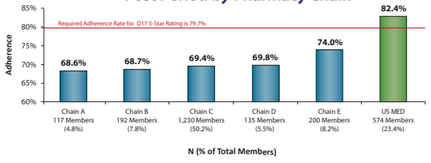


Figure 3c: Statin Adherence in 9-Month Post Period by Pharmacy Chain

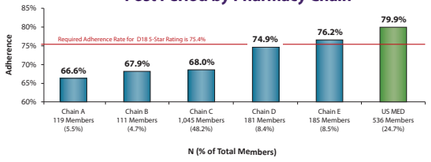


Figure 4. Trend of Adherence Rates by Measure

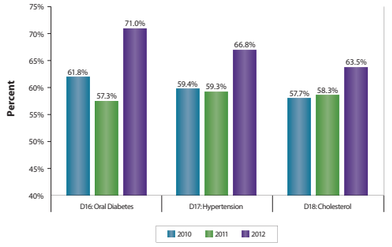
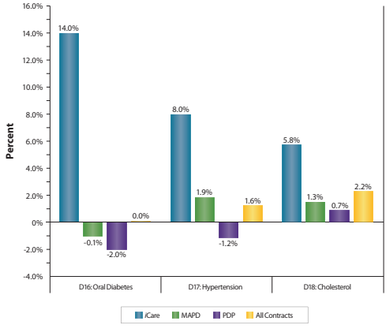


Figure 5: 2011 to 2012 Change in Adherence Rates



Results:

- **Enrollment rates**
  - Upon program implementation, 3,100 beneficiaries were targeted, 1,302 (42%) of which enrolled in the US MED program as of Jan 2013.
  - 133 members opted out, disenrolled from US MED or *i*Care, or requested to be contacted for next prescription refill.
  - 52.5% of beneficiaries were non-adherent to at least one of the 3 adherence measures.
- **Adherence Rates**
  - Change in adherence rates for program enrollees was significantly greater than non-enrollees for each of the 3 measures: oral diabetes, hypertension, and cholesterol *(Table 1)*.
    - Adjusting for gender and pre-period PDC, absolute difference in the change in PDC (post – pre periods) for enrollees compared to non-enrollees was +7.8, +8.8% and +7.7% for ODM, HTN, and CHOL, respectively
  - Among the six highest chains by utilization, members utilizing US MED were associated with the highest adherence rates for all three measures *(Figures 3a, 3b, 3c)*.
- **Calendar Year Performance (CMS Measurement Period)**
  - The overall health plan adherence rates increased significantly for all 3 measures from 2011 to 2012 by 14.0%, 8.0% and 5.8% for ODM, HTN, and CHOL measures respectively *(Figure 4)*.
    - Rate increases were significantly higher for *i*Care compared with average MADP, PDP and all Part D contracts *(Figure 5)*.

Discussion:

- Rapid enrollment of beneficiaries demonstrated the effectiveness of the enrollment process.
- 42% (1,302 enrolled of 3,100 referred) of targeted beneficiaries enrolled suggesting large potential for further enrollment and subsequent increase in adherence rates.
- Health plan adherence rates increased far greater than the overall MAPD contract average.
- This intervention was conducted on a low-income subsidy (LIS) population which is considered a difficult patient population to contact and typically is observed to have lower adherence levels.
- Low disenrollment rate, 8.7% (113 of 1,302 enrolled members) suggests intervention was effective at maintaining member care.
- The online application allowed both US MED and *i*Care to view recent member utilization and to update member information.
- Targeting all members addressed members near the PDC ≥ 80% threshold.
- Care coordinators were able to identify members utilizing >1 target medication class allowing more efficient outbound call process.

Limitations:

- This program was implemented with one health plan and may not be representative of other MAPD plan experience.
- Although self-selection may have resulted in higher adherence rates for the enrollees in the program as observed by the adherence rates per pharmacy, the overall adherence rate changes demonstrates the effectiveness of the program.
- Actual adherence may differ from observed adherence as measured using administrative claims data.
- Some members may have appropriately discontinued therapy per provider recommendations.

Conclusions:

- Members in this Medicare eligible population benefited from an integrated and targeted communication program to drive positive patient behavior and changes in medication adherence.
- Health plan's pharmacy and care management teams can effectively utilize pharmacy and benefit management partners to offer novel methods to improve member and overall health plan medication adherence.

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