Impact of a Prescription Drug Copayment Policy on Prescription Drug and Health Services Utilization in an Oregon Medicaid Population

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MPH Thesis Seminar

Health Care Expenditures

- 2003 Health Care Expenditures
  - $1,740 billion – National
  - $269.5 billion – Medicaid (State/Federal)
- 2003 Prescription Drugs Expenditures
  - $179.2 billion - National
  - $33.7 billion – Medicaid (State/Federal)

Source: CMS

Medicaid Prescription Drug Policy

- Pricing strategies
  - Rebates
- Generic substitution
- Prior authorization
- Preferred Drug Lists
- Monthly limits
- Cost sharing

Medicaid Cost Sharing Approaches

- Federal Medicaid statue limit to $0.5 - $3.00/ Rx
- Waived if patient is unable to pay
- 81% of state Medicaid programs employ prescription (Rx) copayment policies
- Deficit Reduction Act 2005
  - Flexibility to increase copay/coinsurance
  - Enforceable

Nelson AA, Reeder CE, Dickson WM., The effect of a medicaid drug copayment program on utilization and cost of prescription services. *Medical Care* 1984;22:724-736.

- Impact of $0.50 copay instituted in January 1997 on Rx utilization (claims/client) and expenditures ($/client) – South Carolina
- Pre (1year) /Post (3 years) time-series with control group
- Utilization decreased significantly by 0.28 Rx/client/month in copay versus non copay state
- Rate of utilization decreased significantly by 0.03 rx/client/month versus non copay state

Reeder CE, Nelson AA. The differential impact of copayment on drug use in a medicaid population. *Inquiry* 1985;22:396-403.

- Pre (1year) /Post (3 years) time-series – South Carolina
- Utilization changes($/patient/month) of 10 AHFS drug categories (e.g. antihistamines)
- Significant reductions for all classes except analgesics, sedative/hypnotics
- Rate of change among classes was variable

Tamblyn R et al. Adverse events associated with prescription drug cost-sharing among poor and elderly persons. *JAMA 2001;285:421-428*.

- Quebec instituted 25% Rx coinsurance on elderly and welfare recipients with $200 annual maximum
- 49 month time-series study examining Rx utilization and adverse events
- 41.4% decrease in essential medications
- 21.4% decrease in less essential medications
- Adverse events and ER visits increased significantly among welfare recipients with essential medication reduction

Other Studies

- Rand Health Insurance Experiment
  - Sensitivity to various amounts cost-sharing
- Stuart B, Zacker C. Health Affairs 1999
  - Patients in copay states used less Rx
  - As self-reported health ↓ Rx used did not ↑ at a rate commensurate with non-copay states
- Hsu, J et al. NEJM 2006
  - Medicare Rx Cap
  - noncompliance, ↑ morbidity, and ↑ mortality

Oregon Medicaid Copayment Policies

- Implemented January 1,2003
- Oregon fee-for-service (FFS) patients
- Prescription drugs
  - $2/$3 generic/brand
  - HIV, oncology, family planning drugs, mailorder exempt
- Outpatient services
  - Office visits, outpatient hospital, surgery, chemical dependency, mental health, OT/PT, speech, dental, vision

Oregon Medicaid Copayment Policies

- Some clients exempt
  - Pregnant women, <19 years, NH or CBF, Native Americans
- February 2003 – OHP restructure
  - OHP Standard – expansion population
    - Increased copays, premiums, reduced services
  - OHP Plus – federally mandated eligibility

Objectives

- Determine impact of copay policy on prescription drug utilization and cost among OHP Plus recipients
  - Aggregate
  - Drug class specific
- Estimate the impact of policy on health outcomes (health service utilization)
- Quantify the impact of policy in cohorts of patients with specific chronic diseases

Methods

- Secondary data analysis of state Medicaid pharmacy and medical claims
- OHP Plus FFS patients
- Segmented linear regression (interrupted time series) model of aggregate monthly utilization and cost
  - All affected clients
    - 1/1/02 – 12/31/05 – 36 months
  - Disease specific cohorts
    - 1/1/02 – 12/31/04 – 24 months

Methods – Dependent Variables

- Pharmacy Utilization
  - 36 monthly aggregated estimates
  - # prescriptions / eligible / month (RX PMPM)
  - Ingredient Cost / eligible / month ($ PMPM)

Methods – Dependent Variables

- Drug Class Specific Utilization (RX PMPM)
  - Diabetes mellitus (DM)
    - Insulin, sulfonylureas, metformin, TZDs, etc
  - Reactive airway disease (RAD)
    - Inhaled b-agonists, ICS, ipratropium, etc
  - Cardiovascular disease
    - Diuretics, ACE/ARB, BB, CCB, digoxin, etc
  - Depression
    - SSRI, venlafaxine, bupropion, etc
  - Schizophrenia/psychosis
    - Atypical antipsychotics, haloperidol, etc

Methods – Dependent Variables

- Health service utilization (encounters PMPM)
  - Office visits
    - CPT codes
  - Emergency department (ED) encounters
    - CPT or revenue center codes
  - Hospitalizations
    - DRG codes

Methods – Covariates

- Patient demographics
  - age, sex, race
- Program eligibility
  - Temporary assistance to Needy Families (TANF)
  - Aid to Blind / Disabled (ABAD)
  - Old Age Assistance (OAA)
- Comorbidity
  - Adapted Charlson Comorbidity Index
- Urbanicity
  - Defined by OHSU Oregon Office of Rural Health

Cohort Analysis

- DM
- RAD
- Cardiovascular disease
- Depression
- Schizophrenia

- Identified using encounter ICD9 data
- Sustained enrollment 12 months before and after policy
  - >= 1 encounter every 6 months for 24 months

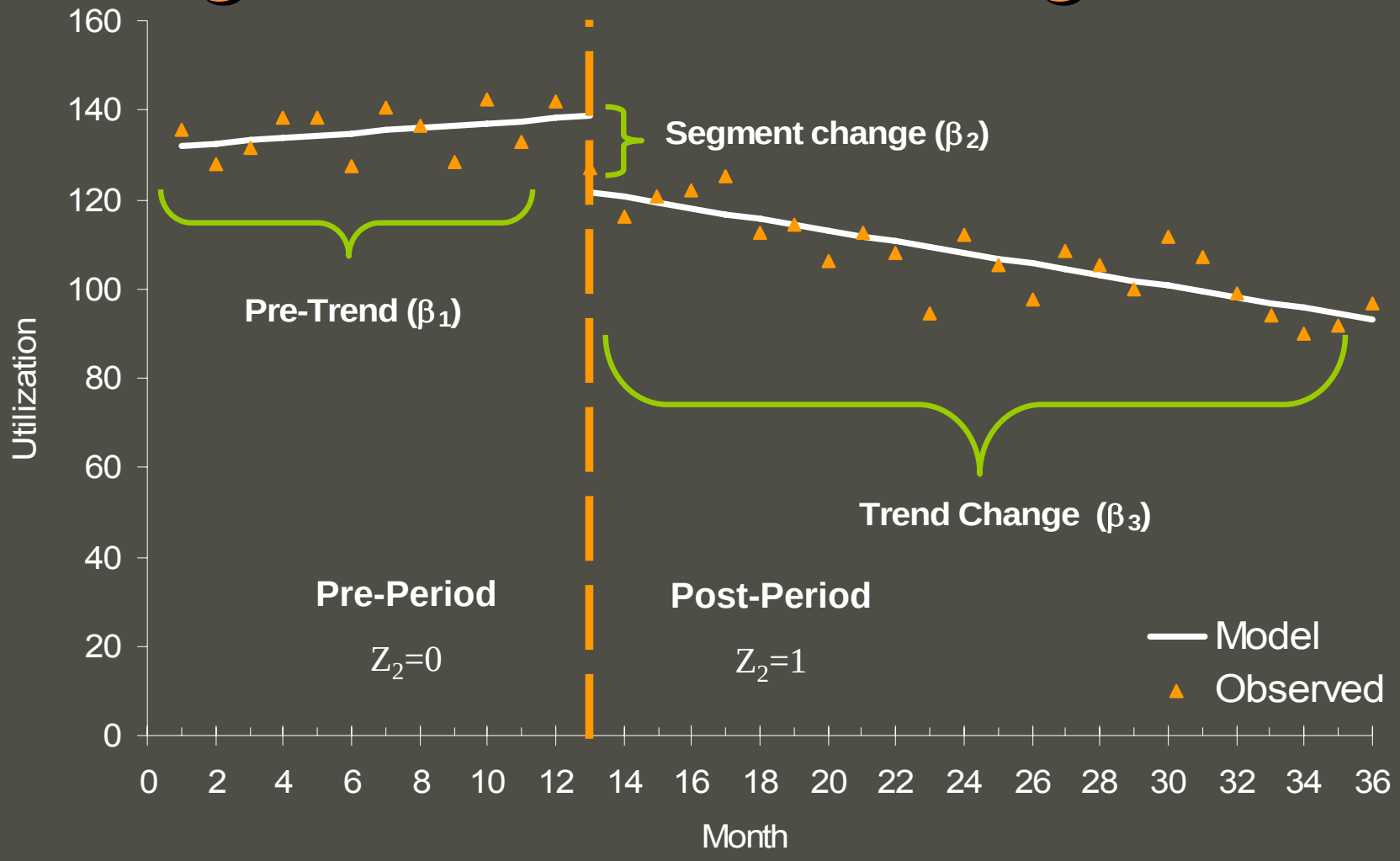
Cohort Analysis

- Dependent variables
  - RX PMPM
    - Drugs specific for condition (e.g. antidepressant use among depression cohort)
    - Drugs not indicated for condition
    - Difference (interaction)
  - Health services utilization among cohort

Segmented Linear Regression (Interrupted Time Series)

- OLS regression
  - Unit of time is independent variable
  - Time series divided into 2 or more segments
- Assumptions
  - Adjusted for 1st degree autocorrelated error
    - Autocorrelation: correlated adjacent error terms violate OLS assumptions → inflation of beta coefficient standard error
    - Durbin Watson Test
- SAS proc autoreg procedure

Segmented Linear Regression



$$y = \beta_0 + \beta_1 x_1 + \beta_2 z_2 + \beta_3 (x_1 - 12) z_2 + \beta' x + \varepsilon$$

Segmented Linear Regression Interpretation

$$y = \beta_0 + \beta_1 x_1 + \beta_2 z_2 + \beta_3 (x_1 - 12) z_2 + \beta' x + \varepsilon$$

X_1 = month number

Z_2 = period indicator variable 0=pre period, 1=post period

β_1 = estimate of pre policy trend (slope)

β_2 = estimate of change in level after policy

- Expressed as % change from what would have been expected without policy

β_3 = estimate of change in trend after policy

$\beta' x$ = covariates

Model Building

- Covariate Selection
  - Best subsets regression
    - R square
    - Mallow's C statistic
    - Akaike's Information Criterion (AIC)
  - Covariates (without policy variables) regressed on dependent to identify best models
- Multicollinearity assessed using correlation matrix (Spearmans/Pearsons)
  - Removed variables with significant associations

Cohort Analysis Interaction Model

$$y = \beta_0 + \beta_1 x_1 + \beta_2 z_2 + \beta_3 (x_1 - 12) z_2 + \beta_4 z_3 + \beta_5 x_1 z_3 + \beta_6 z_2 z_3 + \beta_7 (x - 12) z_2 z_3 + \varepsilon$$

Y = monthly PMPM utilization

X_1= month number

Z_2= period indicator variable 0=pre period, 1=post period

Z_3= drug type indicator 0 = drugs not for condition 1 = drugs for condition

β_0 = Estimate of intercept (mean utilization for first month)

β_1 = Estimate of pre-period time trend (slope)

β_2 = Estimate of level change after copay

β_3 = Estimate of change in trend in post-period

β_4 = Estimate of difference between drugs for condition and drugs not for condition

β_5 = Estimate of difference of pre trend between drug types

β_6 = Estimate of difference of level change after copay between drug types

β_7 = Estimate of difference of post trend between drug types

ε = error term

Exclusions

Exempt from policy

- <19 year of age
- Pregnant women
- Intermediate or long-term care facility
- Native Americans

Drug Specific

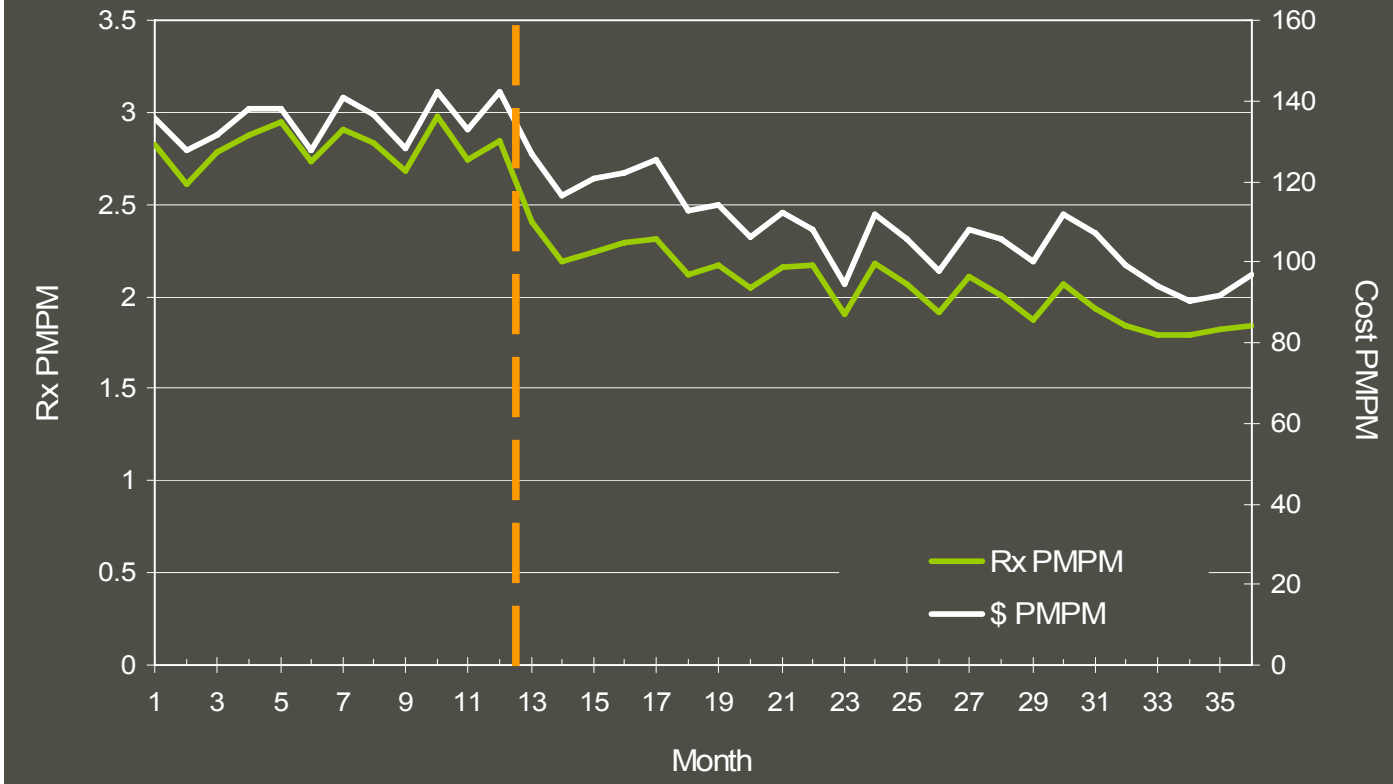
- Family planning
- Infant formula
- Mail order pharmacy
- Drugs affected by Oregon PMPDP
  - Long-acting opioids
  - NSAIDs
  - PPI
  - Statins

Results

Demographics

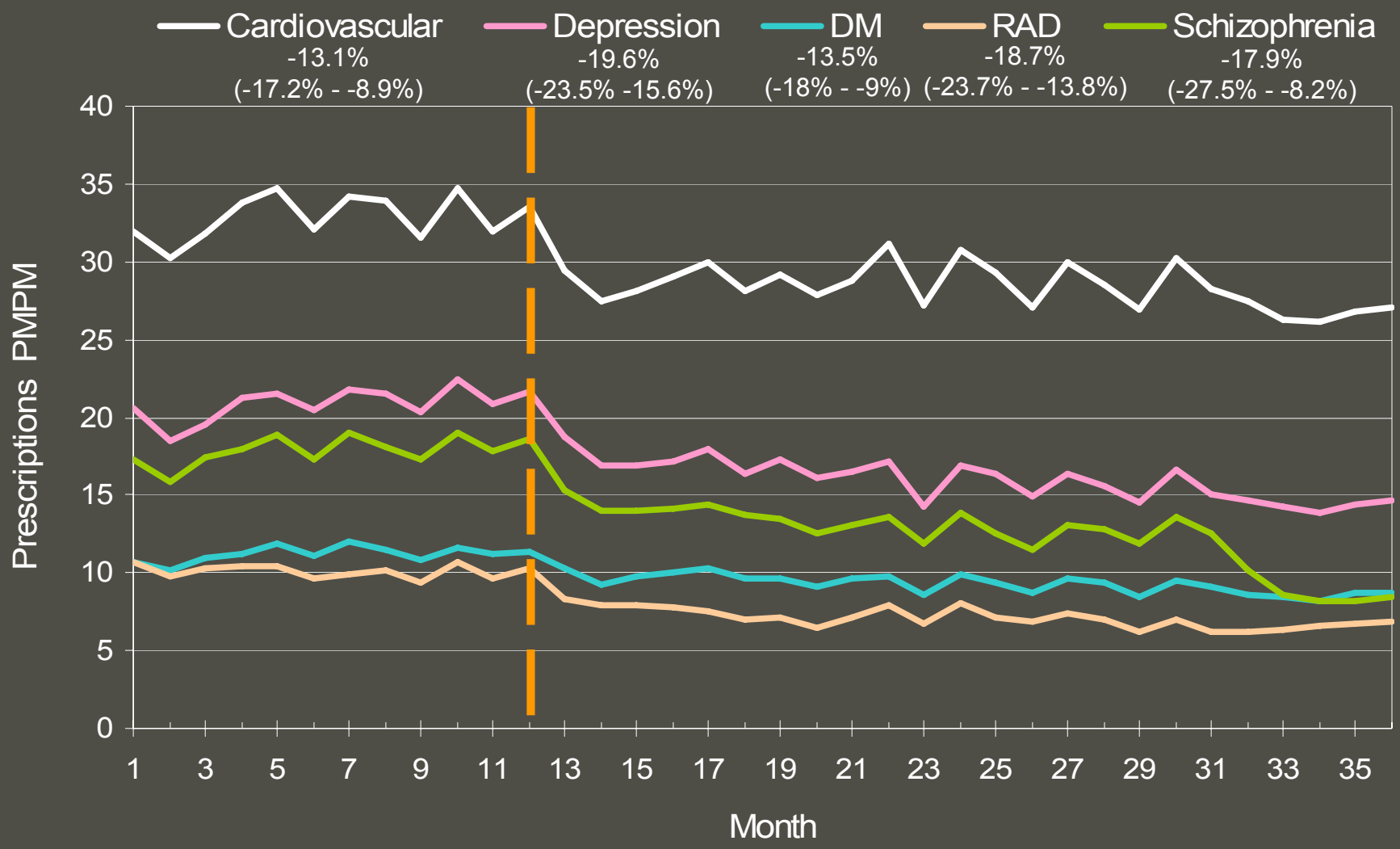
	2002 (n=53,297)		2003 (n=59,734)		2004 (n=62,183)	
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Age	39.16	16.07	38.5	15.07	38.54	15.07
Charlson Index	0.31	0.97	0.32	0.98	0.28	0.92
	Count	**% total**	**Count**	**% total**	**Count**	**% total**
Eligibility						
ABAD	16278	30.5	18761	31.39	17441	28.04
OAA	5328	9.98	4637	7.76	4851	7.8
TANF	31763	59.52	36374	60.85	39906	64.16
Race						
White	44792	83.93	50022	83.69	51925	83.48
Hispanic	3508	6.57	4092	6.85	4594	7.39
Black	2622	4.91	3097	5.18	3158	5.08
Asian	2043	3.83	2151	3.6	2097	3.37
Unknown/Other	404	0.76	410	0.69	424	0.68
Sex						
Female	36304	68.12	40673	68.09	41995	67.54
Region						
Urban	28560	59.08	34907	58.81	34815	56.44

Prescription Drug Utilization

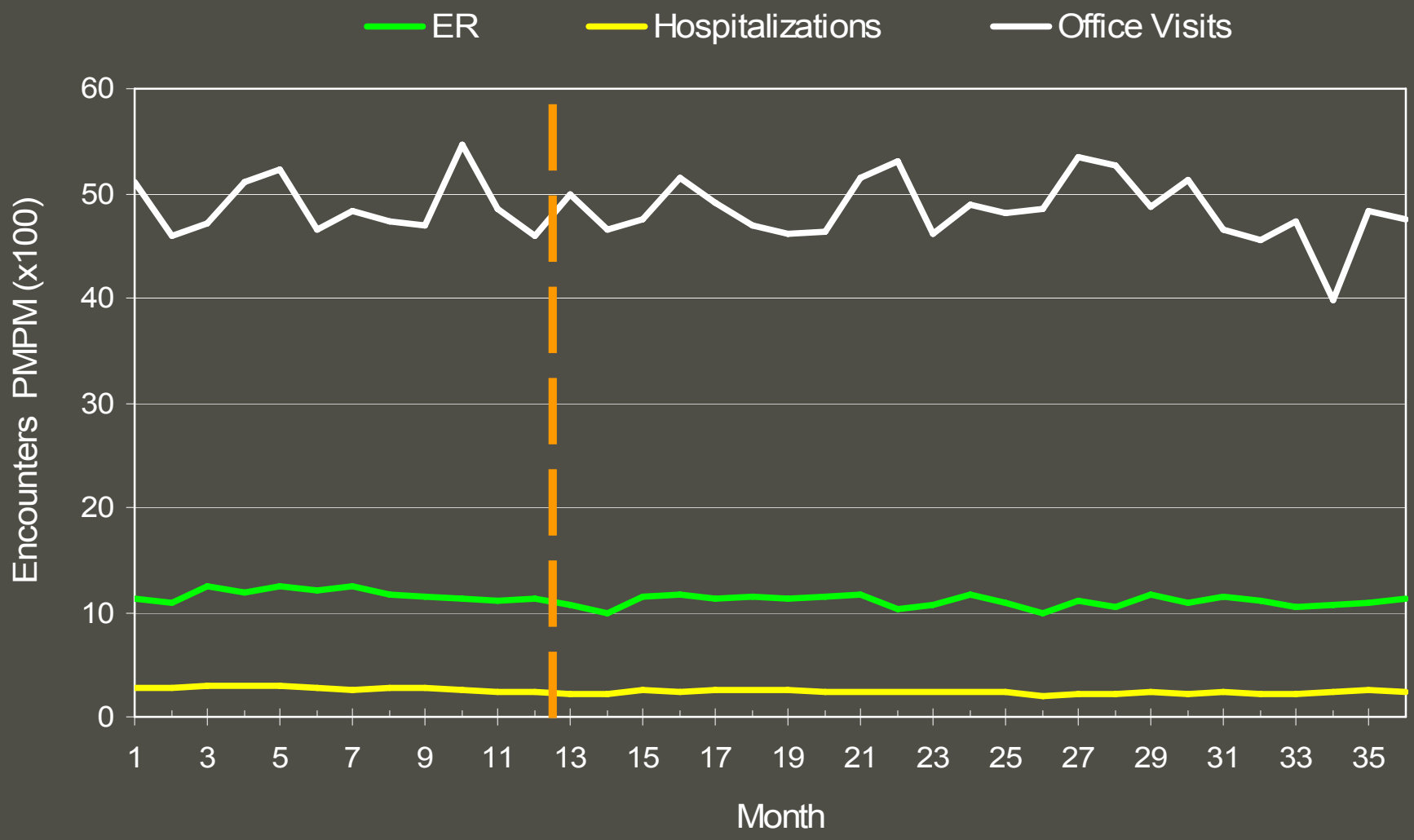


	Unadjusted				Adjusted*			
Segment	**Estimate**	**95 % CI**		**P-value**	**Estimate**	**95 % CI**		**P-value**
Pre-trend	0.0070	-0.0044	0.0184	0.2364	0.0041	-0.0074	0.0155	0.491
Segment change	-19.4%	-22.7%	-18.5%	<.0001	-17.2%	-20.7%	-13.6%	<.0001
Trend change	-0.0291	-0.0410	-0.0172	<.0001	-0.0108	-0.0351	0.0135	0.3894

Class Specific Utilization



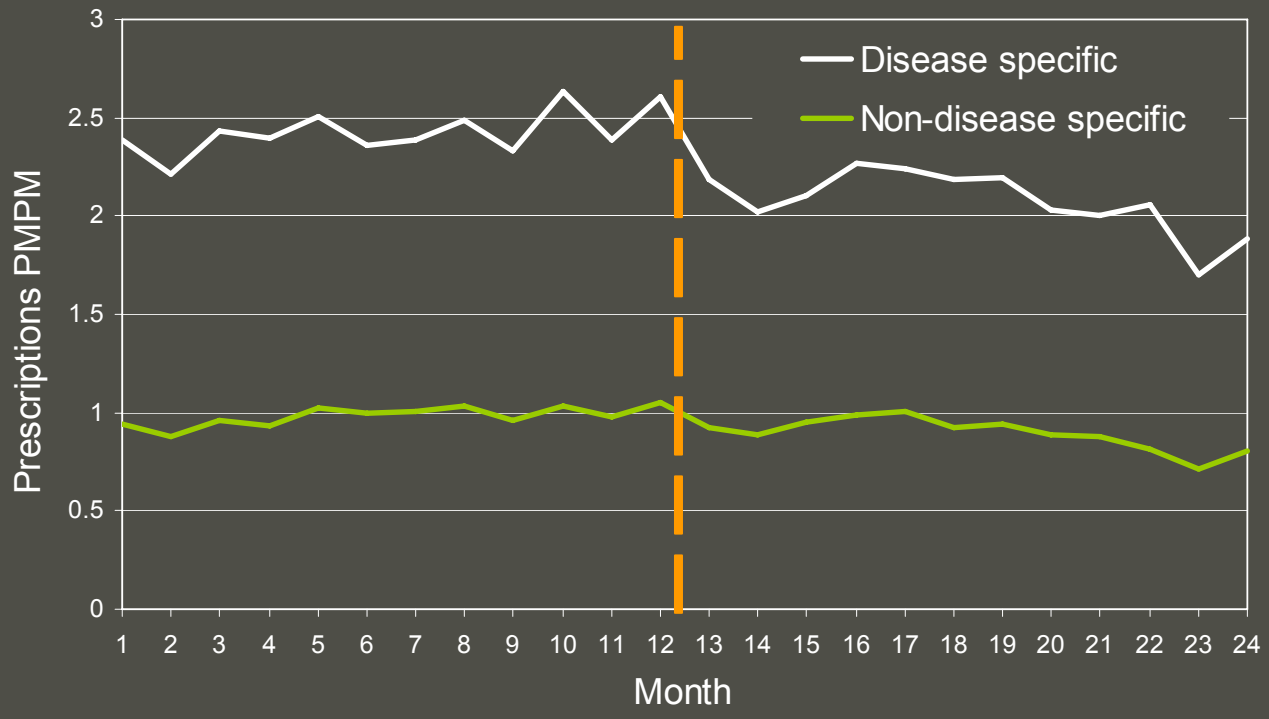
Health Services Utilization



Cohort Demographics

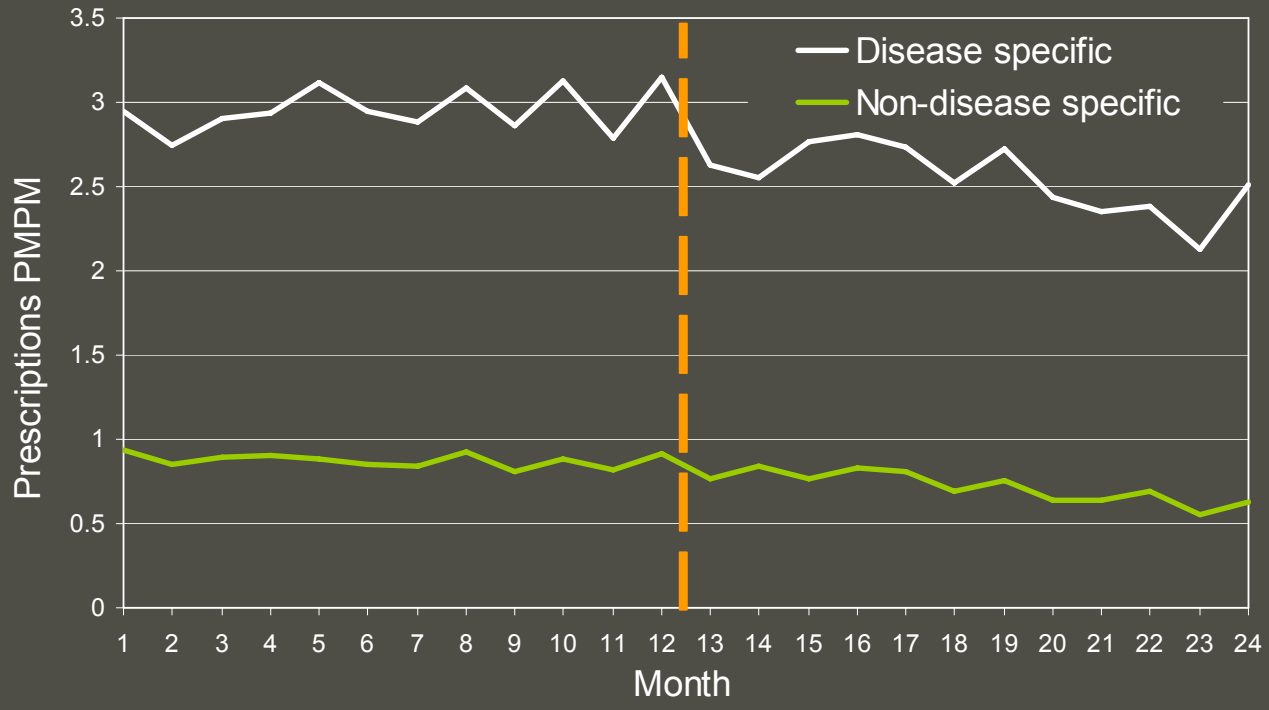
	DM (n=1222)		Cardiovascular (n=519)		RAD (n=451)		Depression (n=546)		Schizophrenia (n=602)	
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Age	53.17	13.9	60.78	13.3	55.18	14.01	53.17	13.9	41.81	10.63
Charlson	3.05	2.13	2.21	2.36	2.43	2.12	0.39	0.95	0.45	1.00
	Count	**% total**	**Count**	**% total**	**Count**	**% total**	**Count**	**% total**	**Count**	**% total**
Eligibility										
ABAD	785	64.24	239	46.05	259	57.43	417	76.37	575	95.51
OAA	381	31.18	269	51.83	177	39.25	65	11.9	27	4.49
TANF	56	4.58	11	2.12	15	3.33	64	11.72	0	0
Race										
White	998	81.67	421	81.12	417	92.46	485	88.83	554	92.03
Hispanic	74	6.06	19	3.66	10	2.22	10	1.83	12	1.99
Black	39	3.19	21	4.05	5	1.11	8	1.47	22	3.65
Asian	102	8.35	53	10.21	16	3.55	4	0.73	11	1.83
Unknown/Other	9	0.74	5	0.96	3	0.67	39	7.14	3	0.5
Sex										
Female	834	68.25	314	60.5	311	68.96	401	73.44	224	37.21
Region										
Urban	664	55.89	290	58.23	208	47.38	211	61.7	436	74.91

DM Cohort – Rx PMPM



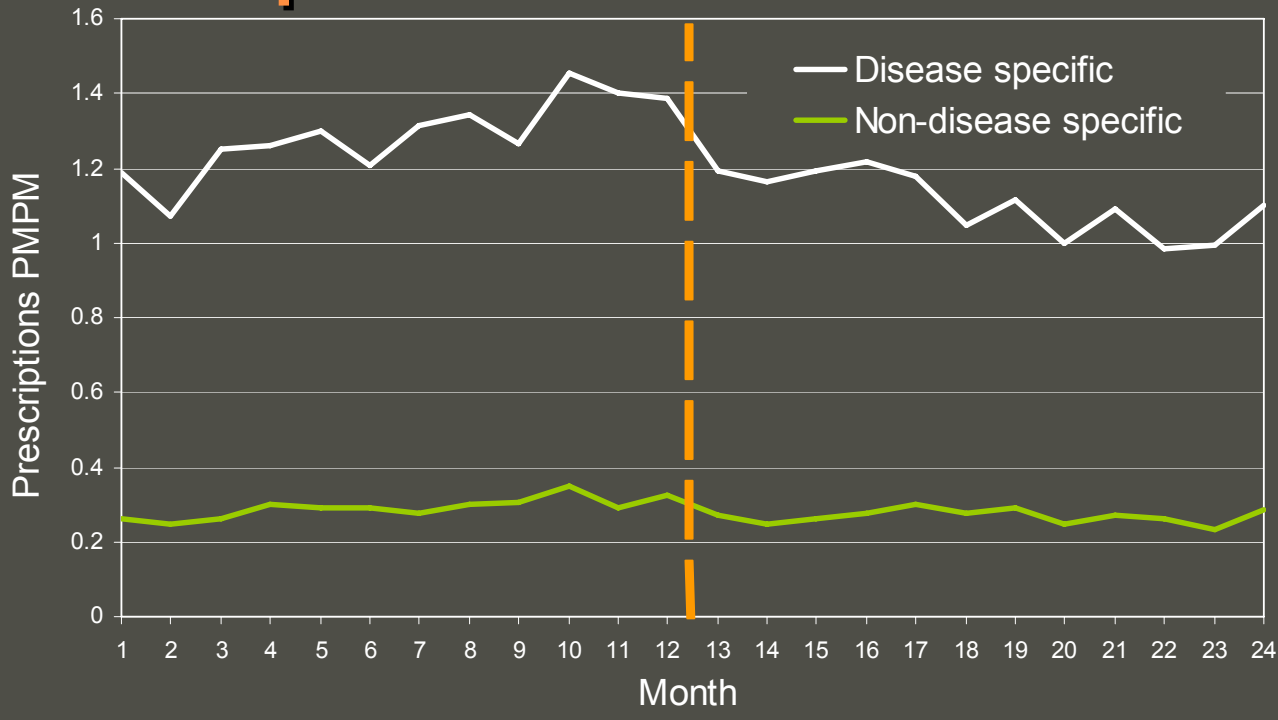
	Disease Specific				Non-disease Specific				
Coefficient	**Estimate**	**95% CI**		**P-value**	**Estimate**	**95% CI**		**P-value**	**Interaction P- value**
Pre-trend	0.0106	0.0008	0.0204	0.0477	0.0172	-0.0001	0.0345	0.0669	0.4641
Segment Change	-7.2%	-16.0%	1.6%	0.3092	-11.6%	-18.4%	-4.9%	0.0107	0.0336
Trend Change	-0.0262	-0.0405	-0.0119	0.0019	-0.0475	-0.0716	-0.0234	0.0011	0.1469

RAD Cohort – Rx PMPM



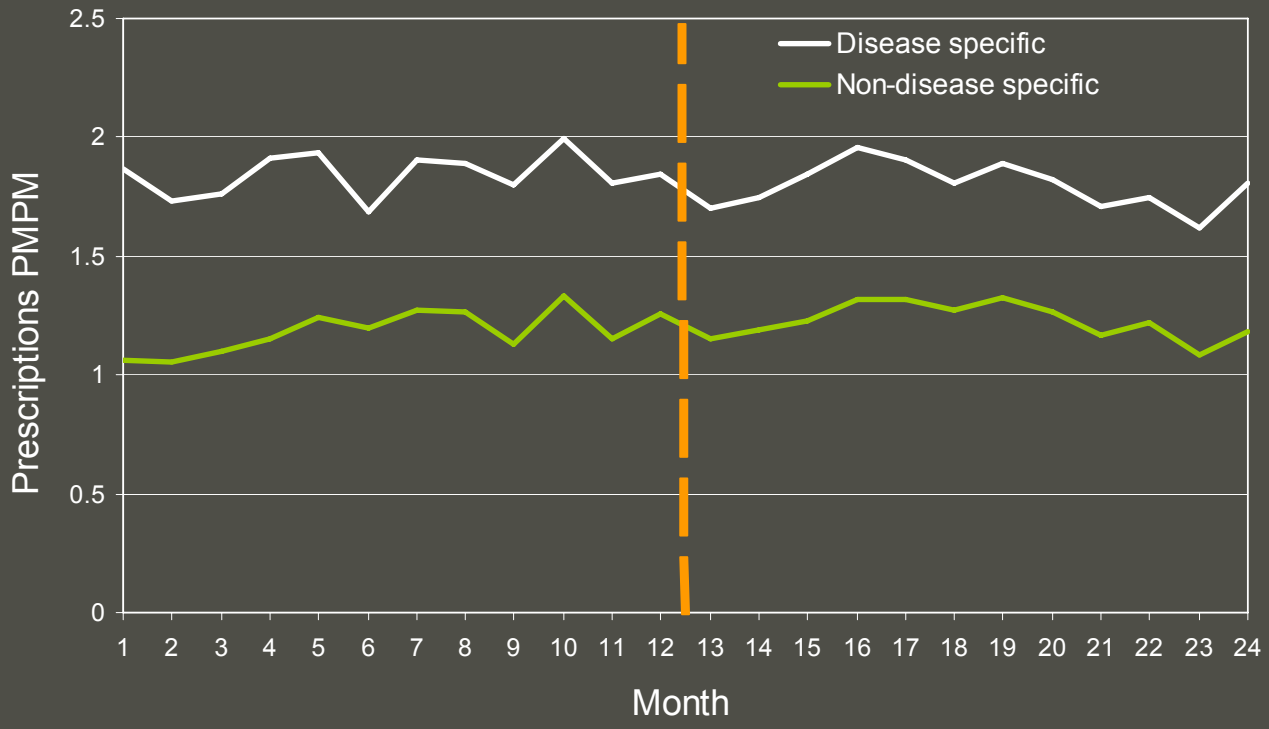
	Disease Specific				Non-disease Specific				
Coefficient	**Estimate**	**95% CI**		**P-value**	**Estimate**	**95% CI**		**P-value**	**Interaction P- value**
Pre-trend	-0.0042	-0.0086	0.0002	0.0801	0.0114	-0.0073	0.0301	0.2462	0.0918
Segment Change	-0.1%	-5.3%	5.1%	0.4375	-8.3%	-14.4%	-2.1%	0.0521	0.0323
Trend Change	-0.0186	-0.0247	-0.0125	<0.001	-0.0529	-0.0788	-0.0270	0.0008	0.0136

Depression Cohort – Rx PMPM



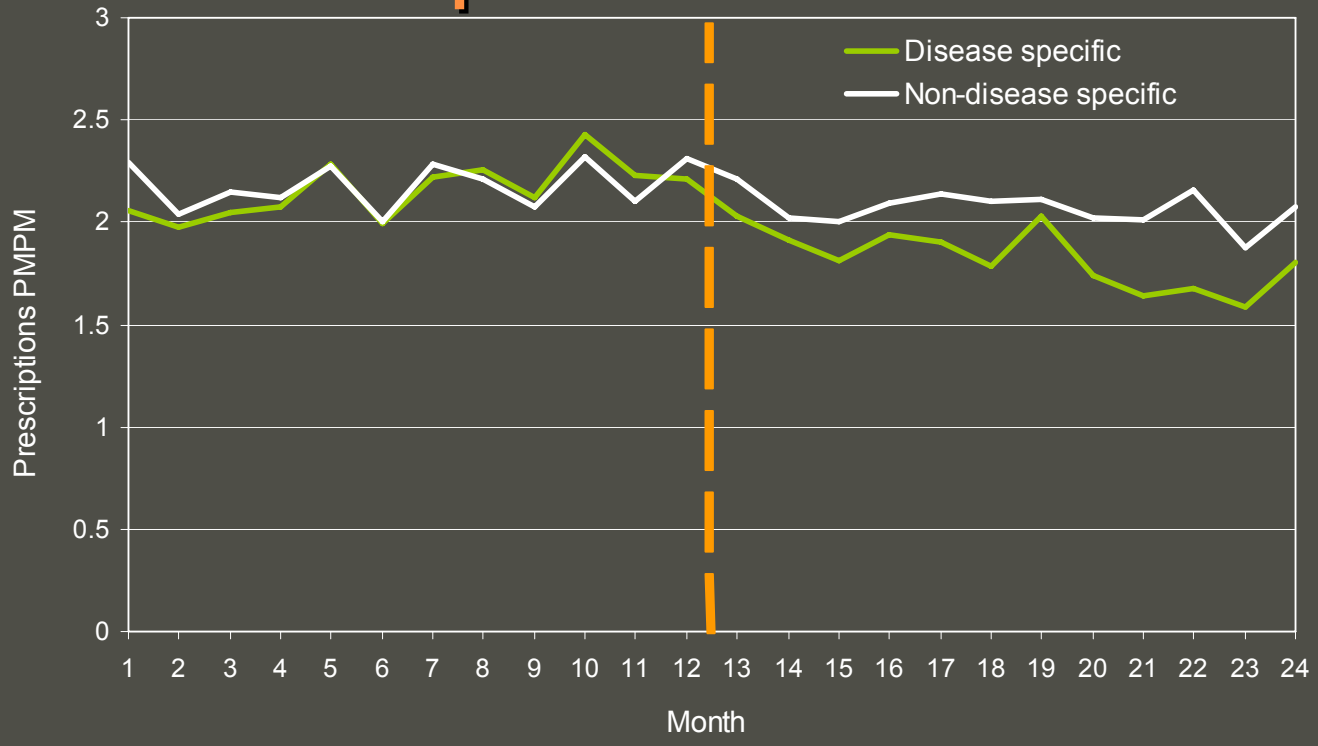
	Disease Specific				Non-disease Specific				
Coefficient	**Estimate**	**95% CI**		**P-value**	**Estimate**	**95% CI**		**P-value**	**Interaction P- value**
Pre-trend	0.0059	0.0029	0.0088	0.0009	0.0246	0.0171	0.0321	<0.0001	<0.0001
Segment Change	-17.3%	-26.1%	-8.4%	0.0032	-16.5%	-21.7%	-11.3%	<0.0001	0.0007
Trend Change	-0.0067	-0.0108	-0.0026	0.0047	-0.0433	-0.0537	-0.0329	<0.0001	<0.0001

Cardiovascular Cohort – Rx PMPM



	Disease Specific				Non-disease Specific				
Coefficient	**Estimate**	**95% CI**		**P-value**	**Estimate**	**95% CI**		**P-value**	**Interaction P- value**
Pre-trend	0.0172	0.0035	0.0309	0.0229	0.0056	-0.0104	0.0215	0.5025	0.2986
Segment Change	-3.4%	-13.5%	6.8%	0.7538	-2.3%	-10.6%	6.0%	0.7069	0.8375
Trend Change	-0.0224	-0.0420	-0.0028	0.0379	-0.0128	-0.0353	0.0097	0.2776	0.5124

Schizophrenia Cohort – Rx PMPM

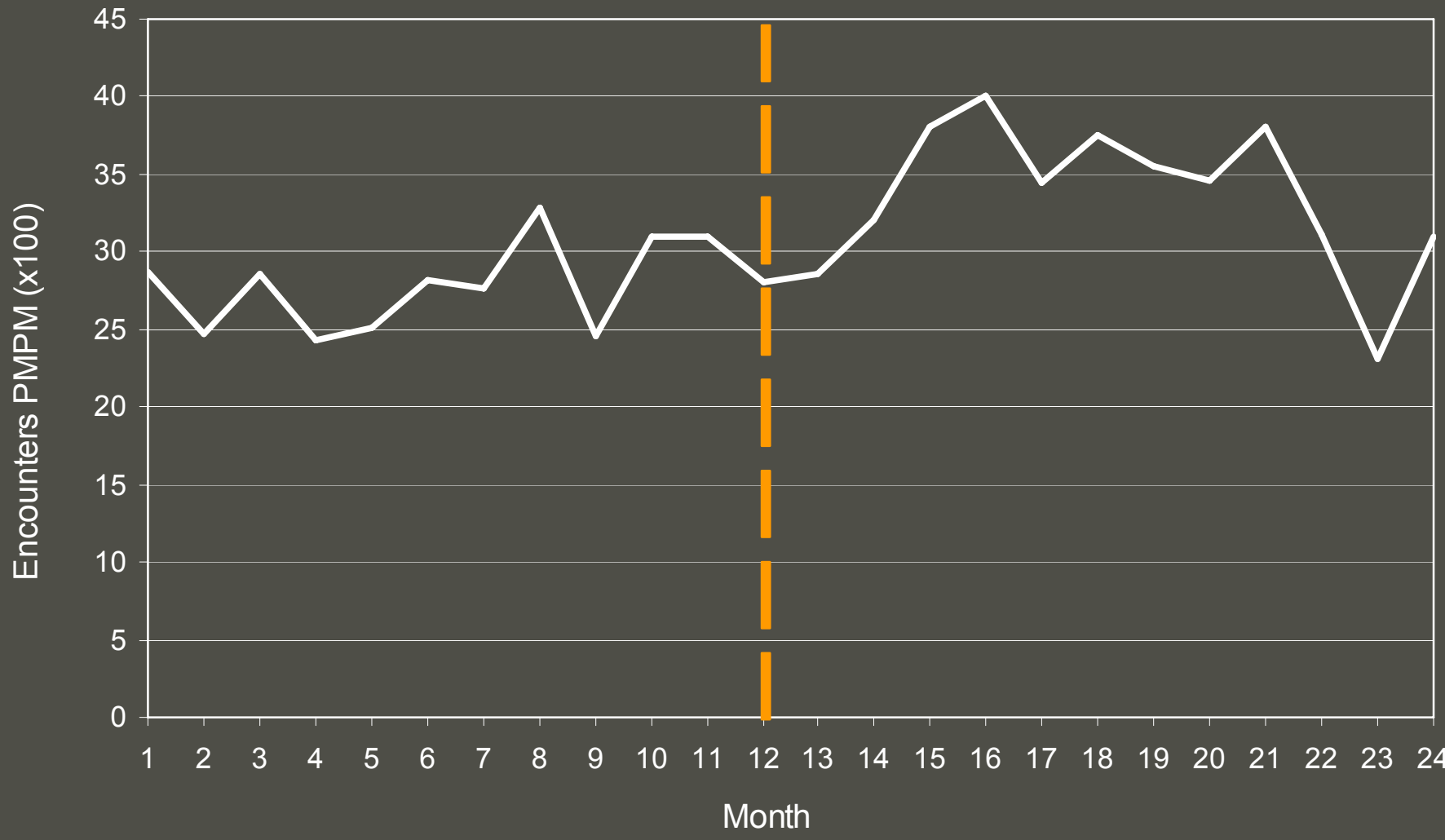


	Disease Specific				Non-disease Specific				
Coefficient	**Estimate**	**95% CI**		**P-value**	**Estimate**	**95% CI**		**P-value**	**Interaction P- value**
Pre-trend	0.0088	-0.0014	0.0189	0.1063	0.0262	0.0135	0.0389	0.0007	0.0291
Segment Change	-5.2%	-9.7%	-0.7%	0.0714	-15.2%	-20.7%	-9.8%	0.0002	0.0165
Trend Change	-0.0178	-0.0317	-0.0039	0.0217	-0.0552	-0.0728	-0.0376	<0.0001	0.0034

Cohort Health Services Utilization

Cohort / Segment	Estimate	95% CI		P-value
Diabetes Mellitus - Office visits				
Pre-trend	0.35	-0.62	1.32	0.4834
Segment change	3.5%	-7.9%	14.9%	0.4301
Trend change	-0.90	-2.35	0.54	0.2355
Diabetes Mellitus - ER encounters				
Pre-trend	0.17	-0.09	0.44	0.2182
Segment change	-3.1%	-22.7%	16.4%	0.8778
Trend change	-0.18	-0.59	0.22	0.385
Cardiovascular - Office visits				
Pre-trend	0.88	0.03	1.72	0.0559
Segment change	3.3%	-7.3%	14.0%	0.3469
Trend change	-1.48	-2.67	-0.29	0.025
RAD - Office visits				
Pre-trend	0.45	-0.50	1.41	0.3656
Segment change	1.3%	-10.4%	12.9%	0.7692
Trend change	-0.40	-1.74	0.93	0.5606
Depression - Office visits				
Pre-trend	0.32	-0.39	1.04	0.3881
Segment change	18.5%	-4.5%	41.4%	0.0922
Trend change	-0.69	-1.71	0.34	0.204

Depression Cohort – Office Visits



Limitations and Summary

Limitations

- No control group used
  - Secular confounding
- Confounding policy
  - outpatient series copayment
  - Oregon Practioner Managed Prescription Drug Plan (PMPDP)
- Ecologic fallacy
- Claims data
  - Misclassification
  - Health services surrogate of health outcomes
- External validity

Summary – All Enrolled

- 17% reduction in utilization
  - No change in trend
- Significant decreases across all classes
  - depression > RAD > schizophrenia > DM > cardiovascular
- No evidence for increases in health services utilization

Summary - Cohorts

- Patients with depression and schizophrenia showed significant decreases in drugs for their condition
- Patients with DM, depression, and schizophrenia showed significant decreases in drugs not for their condition
- Patients with depression showed a marginally significant increase in office visits

Conclusions

- “nominal” copays for prescription drug leads to non-nominal changes in prescription drug utilization
- Office visits increased among depressed patients
- Use caution in applying indiscriminate cost-sharing policies for vulnerable populations

Additional Slides

	Un-Adjusted				Adjusted*			
Segment	**Estimate**	**95 % CI**		**P-value**	**Estimate**	**95 % CI**		**P-value**
DM-related Medications								
Pre-trend	0.0647	0.0002	0.1292	0.0583	0.0656	0.0035	0.1277	0.0473
Segment change	-14.3%	-18.9%	-9.7%	<.0001	-13.5%	-18.0%	-9.0%	<.0001
Trend change	-0.1267	-0.1945	-0.0589	0.0009	-0.1122	-0.1751	-0.0493	0.0016
Cardiovascular-related Medications								
Pre-trend	0.1419	-0.0598	0.3436	0.1776	0.1859	0.0209	0.3509	0.0354
Segment change	-13.2%	-18.1%	-8.3%	<.0001	-13.1%	-17.2%	-8.9%	<.0001
Trend change	-0.2267	-0.4390	-0.0144	0.04	-0.1707	-0.3377	-0.0037	0.0545
RAD-related Medications								
Pre-trend	-0.0301	-0.0989	0.0387	0.3971	-0.0372	-0.0954	0.0210	0.2204
Segment change	-20.7%	-26.4%	-15.0%	<.0001	-18.7%	-23.7%	-13.8%	<.0001
Trend change	-0.0356	-0.1081	0.0369	0.3436	-0.0207	-0.0797	0.0383	0.4967
Depression-related Medications								
Pre-trend	0.2001	0.0997	0.3005	0.0005	0.1899	0.0868	0.2930	0.0011
Segment change	-20.1%	-23.8%	-16.4%	<.0001	-19.6%	-23.5%	-15.6%	<.0001
Trend change	-0.3511	-0.4560	-0.2462	<.0001	-0.3452	-0.4508	-0.2396	<.0001
Schizophrenia-related Medications								
Pre-trend	0.1309	-0.0935	0.3553	0.2614	0.1327	-0.0905	0.3559	0.2534
Segment change	-18.6%	-28.1%	-9.2%	0.0017	-17.9%	-27.5%	-8.2%	0.0029
Trend change	-0.3872	-0.6359	-0.1385	0.0046	-0.3503	-0.5900	-0.1106	0.0077

*DM, cardiovascular, RAD, Schizophrenia adjusted for TANF and black race; Depression adjusted for black race

The Effects of Eliminating Behavioral Health Benefits on OHP "Standard" Enrollees

OHREC June 13, 2006

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Supported by funding from the Robert Wood Johnson Foundation's Changes in Health Care Financing and Organization program

Study Objectives

Identify the impact of eliminating behavioral health benefits

- methadone treatment
- other substance abuse treatment
- outpatient mental health

on expenditures for Oregon Health Plan "Standard" enrollees

(Non-categorically eligible adults with income < 100% FPL)

Policy Relevance

- Within state:
  - What happened to these enrollees?
  - Also : “The Price for Cutting Oregon Health Plan Substance Abuse Programs” Roy Gabriel & Dennis Deck, April, 2003
- Nationally:
  - Most states considering cuts in Medicaid
  - Benefit reductions may cause unintended responses if substitution to remaining benefits is feasible

Oregon Health Plan Changes

- Benefit policy changes for expansion beneficiaries beginning in February, 2003:
  - Establish premiums & co-payments
  - Eliminate benefits (Dental, Eye, Hearing, Outpatient MH/CD, DME/Supplies, Non-Emergent Transportation)
  - More stringent premium payment rules w/ six-month “lock-out”

Co-Payment Schedule

- Inpatient hospital - $250 per admission
- Outpatient hospital - $20 Surgery, $5 other
- Emergency Room - $50 (waived if admitted)
- Physician - $5 (vaccine/preventative $0)
- Lab/X-ray - $3 each
- RX - $2 preferred,$3 generic,$15 brand name
- Ambulance - $50
- Home Health/Other Therapists - $5

Methods

- Pre/Post difference-in-differences
- 3 treatment/study groups
  - Methadone treatment users
  - Other substance abuse treatment users
  - Outpatient mental health users
- Comparison group: same benefit package but no history of accessing eliminated benefits
- Benefit users matched to comparison group through Mahalonobis matching

Study Period

- Pre: November 2001 - October 2002
  Post: May 2003 - April 2004
- 12 months pre/12 months post
- Remove 6 month period around OHP benefit changes to avoid implementation effects

Study Sample

- Oregon Medicaid “expansion” enrollees

- 3 study (“treated”) groups
  1. Methadone benefit users (N = 241)
  2. Other SA benefit users (N = 339)
  3. Outpatient MH users (N = 654)

- 1 comparison group
  1. None of the “eliminated benefits” accessed (N = 10,076)

Data

- FFS claims and MCO encounter data
- Claims and encounter data valued at average FFS rates during study period
- Only covered services after policy change
  - (MH/SA outpatient excluded)

Estimation

- We want to “match” benefit users to non-benefit users
  - Net out the effect of other policy changes
- Large literature from labor economics
  - “Treatment effects”
- The most well-known approach is to use the propensity score
  - But we did not use this method…

Problems with the propensity score

1. Timing/sequencing of events
2. Model fit not good
3. Covariates that are important to outcome not related to treatment
4. Estimating variance?
5. Sensitivity to implementation
   - Amount of trimming
   - Kernel choice
   - Bandwidth choice
   - Kernel vs. Local linear regression

Solution: covariate matching

- Match on your X variables using distance measure (Mahalonobis)
  - Other studies compare this method to propensity score and find no clear winner
- Advantages of this method
  - Intuitive matching
  - Robust variance estimation

Estimation

- Y is pre-post *change* in PMPM expenditures
- Find 1-1 nearest neighbor matches through
- Bias-correction through regression
  - Adjusts for imperfect matches
- Effect of benefit elimination is defined as

  Y(methadone user i) – Y(nearest match) – bias correction terms

Matching on

- Sex
- Income
- Previous diagnosis of mental illness
- FFS/MCO
- Previous PMPM expenditures on IP, OP, Pro, ED, Drug

Sensitivity Analyses

- Increase number of matches from 1 to 5
  - Matching w/replacement
- Alternative matching through GenMatch (Diamond & Sekhon 2005)

Results

Key characteristics: Methadone users & control group

	Methadone users	Control group (unmatched)	T-stat	Control group (matched)	T-stat
Male	54%	39%	-4.6	54%	1.0
Income	$126	$469	24.6	$143	2.2
MH DX	32%	16%	-5.2	32%	-0.6
FFS	28%	17%	-3.6	27%	-1.4
Inpatient PMPM	$81	$39	-1.8	$74	-1.5
ED PMPM	$16	$6	-4.0	$13	-3.5

Preliminary results: Methadone

TOTAL	Pre-Period	Post-Period	Change	D-in-D Estimate
Methadone users	$292	$402	$111	**$144 ($48, $240)**
Non-benefit users	$216	$231	$16	
INPATIENT	Pre-Period	Post-Period	Change	D-in-D Estimate
Methadone users	$81	$187	$106	**$117 ($34, $199)**
Non-benefit users	$39	$58	$18	
OUTPATIENT	Pre-Period	Post-Period	Change	D-in-D Estimate
Methadone users	$29	$48	$19	**$24 ($5, $42)**
Non-benefit users	$29	$37	$8	
PROFESSIONAL	Pre-Period	Post-Period	Change	D-in-D Estimate
Methadone users	$54	$65	$11	$0 ($-17, $17)
Non-benefit users	$54	$56	$2	
ED	Pre-Period	Post-Period	Change	D-in-D Estimate
Methadone users	$16	$17	$1	$3 (-1$, $7)
Non-benefit users	$6	$7	$1	
DRUG	Pre-Period	Post-Period	Change	D-in-D Estimate
Methadone users	$111	$86	-$25	$4 (-$22, $31)
Non-benefit users	$87	$73	-$14	

Methadone users

- Very large increase in expenditures
- Primarily driven by hospital expenditures
  - Mostly inpatient, some outpatient
- Not much evidence of increased prescription drug use
- Robust to all specifications

Preliminary results: Other Sub. Abuse

TOTAL	Pre-Period	Post-Period	Change	D-in-D Estimate
CD users	$254	$357	$103	$67 (-$18, $154)
Non-benefit users	$216	$231	$16	
INPATIENT	Pre-Period	Post-Period	Change	D-in-D Estimate
CD users	$64	$94	$30	$27 (-$13, $68)
Non-benefit users	$39	$58	$18	
OUTPATIENT	Pre-Period	Post-Period	Change	D-in-D Estimate
CD users	$31	$47	$16	`-$18 (-$67, $32)
Non-benefit users	$29	$37	$8	
PROFESSIONAL	Pre-Period	Post-Period	Change	D-in-D Estimate
CD users	$61	$106	$45	**$41 ($17, $66)**
Non-benefit users	$54	$56	$2	
ED	Pre-Period	Post-Period	Change	D-in-D Estimate
CD users	$18	$27	$9	**$11 ($4, $18)**
Non-benefit users	$6	$7	$1	
DRUG	Pre-Period	Post-Period	Change	D-in-D Estimate
CD users	$80	$83	$3	$15 (-$1, $33)
Non-benefit users	$87	$73	-$14	

Other substance abuse users

- Increase in expenditures
  - Less than methadone
  - Not driven by hospital expenditures
    - Professional & ED
    - Opposite pattern in comparison to methadone users
- No evidence of increased prescription drug use
- “Significance” depends on model specification

Preliminary results: Mental Health

TOTAL	Pre-Period	Post-Period	Change	D-in-D Estimate
MH users	$435	$422	-$14	-$13 (-$79, $52)
Non-benefit users	$216	$231	$16	
INPATIENT	Pre-Period	Post-Period	Change	D-in-D Estimate
MH users	$58	$71	$13	-$12 (-$57, $45)
Non-benefit users	$39	$58	$18	
OUTPATIENT	Pre-Period	Post-Period	Change	D-in-D Estimate
MH users	$37	$45	$7	-$1 (-$11, $9)
Non-benefit users	$29	$37	$8	
PROFESSIONAL	Pre-Period	Post-Period	Change	D-in-D Estimate
MH users	$73	$77	$4	$0 (-$6, $15)
Non-benefit users	$54	$56	$2	
ER	Pre-Period	Post-Period	Change	D-in-D Estimate
MH users	$12	$11	-$1	-$2 (-$5, $1)
Non-benefit users	$6	$7	$1	
DRUG	Pre-Period	Post-Period	Change	D-in-D Estimate
MH users	$254	$218	-$37	**$36 ($18, $54)**
Non-benefit users	$87	$73	-$14	

Outpatient mental health

- No change in total expenditures
- Robust to all types of specification
- Some evidence of increased prescription drug use
  - Only relative to non-benefit users

Conclusions

- Loss of methadone benefit:
  Large increase in total expenditures
- Loss of other substance abuse benefit:
  Increase in professional & ED expenditures
- Loss of outpatient mental health benefit:
  No change in total expenditures
  - Caveats on Medicaid “expansion” group
  - Drug exp. up relative to control group
- Very similar results with GenMatch & multiple matches
  - Suggests balance achieved through covariate matching

What's happening?

Possible contributing factors:

1. Severely mentally ill eligible as disabled; not true for substance abuse disorders

2. Substance abuse probably coincides with more "toxicity" than mental illness

3. Substitution of pharmaceuticals prescribed by PCP for outpatient mental health therapy

Limitations

- Assume that changes are because of benefit elimination, but could be that benefit users respond to co-payments differently than non-benefit users
- Selecting a small group of benefit users who stayed on the plan
  - Different response from those who left the plan?