

Project Overview
Title: Association of State Medicaid Prescription Cap Policies with Trajectories of Buprenorphine Use for Opioid Use Disorder
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Data Sources	File path	Years
Medicaid T-MSIS Analytic Files (TAF)		
Demographic and Eligibility (DE) file	max.tpallann_YYYY	2014 – 2015
Pharmacy (RX) file	max.tdallclm_YYYY max.tdallline_YYYY	2014 – 2015
Inpatient (IP) file	max.tiallclm_YYYY max.tiallline_YYYY	2014 – 2015
Long Term Care (LTC) file	max.tlallclm_YYYY max.tlallline_YYYY	2014 – 2015
Other Services (OT) file	max.ttallclm_YYYY max.ttallline_YYYY	2014 – 2015
Medicaid T-MSIS Analytic Files (TAF)		
Demographic and Eligibility (DE) file	max.mpallann_YYYY	2010 – 2015
Pharmacy (RX) file	max.mdallclm_YYYY max.mdallline_YYYY	2010 – 2015
Inpatient (IP) file	max.miallclm_YYYY max.miallline_YYYY	2010 – 2015
Long Term Care (LTC) file	max.mlallclm_YYYY max.mlallline_YYYY	2010 – 2015
Other Services (OT) file	max.mtallclm_YYYY max.mtallline_YYYY	2010 – 2015
Other referenced or publicly available data		
Rural-Urban Continuum	US Department of Agriculture	2013
National Drug Abuse Treatment System Survey	American Society of Addiction Medicine	2014
Medicaid Coverage of MAT	SAMHSA, HHS	2018

Cohort Description		
Sample	Source	Criteria
People with OUD who received incident buprenorphine prescription fills (using 6-month lookback window)	MAX DE file MAX IP header file MAX OT header file TAF DE file TAF IP header file TAF OT header file	Adult, non-elderly (age 22-64) Not dual eligible for Medicare Residing in a single state for duration Continuously eligible for Medicaid for duration Community dwelling (not an institutional resident)

Independent variable	Source	Notes
GBTM Trajectory Group	Generated using group-based trajectory modelling	Categorical, defined using a 5-group quadratic GBTM model Five-level definition: - 1 - 2 - 3 - 4 - 5
Dependent variables	Source	Notes
Cap status	State policy	Binary, constant over observation Two-level definition: - No cap - Cap
Age	MAX DE file TAF DE file	Categorical, 4 groups: - 22 to 34 - 35 to 44 - 45 to 54 - 55 to 64
Female sex	MAX DE file TAF DE file	Binary
Race	MAX DE file TAF DE file	Categorical, 5 groups: - White - Black - Hispanic - Other Race - Unknown
2013 Rural-urban continuum code	MAX DE file TAF DE file USDA	Binary, defined using baseline county code - Metropolitan: RUCC values 1, 2, 3 - Urban: RUCC values 4, 5, 6 - Rural: RUCC values 7, 8, 9
Scope of Medicaid benefit	MAX DE file TAF DE file	Binary, defined during 6-month baseline
Medicaid MCO enrollment	MAX DE file TAF DE file	Categorical, defined during 6-month baseline - FFS/Unknown - Full - Partial
Medicaid eligibility category	MAX DE file TAF DE file	Categorical, defined during 6-month baseline - Adult - Disabled - Other
Any emergency department visit	MAX IP line file MAX OT line file TAF IP line file TAF OT line file	Binary, defined during 6-month baseline Revenue center codes 0450 to 0459, 0981
Any inpatient visit	MAX IP header file TAF IP header file	Binary, defined during 6-month baseline

Tobacco use disorder	MAX IP header file MAX OT header file TAF IP header file TAF OT header file	Binary, defined during 6-month baseline
Alcohol use disorder	MAX IP header file MAX OT header file TAF IP header file TAF OT header file	Binary, defined during 6-month baseline
Serious mental illness	MAX IP header file MAX OT header file TAF IP header file TAF OT header file	Binary, defined during 6-month baseline - Schizophrenia or related disorder - Bipolar disorder - Major depressive disorder
Non-opioid substance use disorder	MAX IP header file MAX OT header file TAF IP header file TAF OT header file	Binary, defined during 6-month baseline - Cannabis use disorder - Cocaine use disorder - Sedative use disorder - Other drug use disorder
Year of first buprenorphine receipt	MAX IP header file MAX OT header file TAF IP header file TAF OT header file	Categorical, defined during 6-month baseline - 2010 - 2011 - 2012 - 2013 - 2014 - 2015
Medicaid coverage for ASAM levels of care continuum	MAX IP header file MAX OT header file TAF IP header file TAF OT header file	Categorical, constant over observation - Low restriction - Medium restriction - High restriction
Medicaid coverage policy	MAX IP header file MAX OT header file TAF IP header file TAF OT header file	Binary, constant over observation - 2 or fewer MOUD are covered - All 3 MOUD are covered
Comorbidity count	MAX IP header file MAX OT header file TAF IP header file TAF OT header file HCUP	ICD-9/10 Gagne comorbidity count Categorical, unweighted sum - Alcohol abuse - Deficiency anemias - Any tumor - Arrhythmias - Metastatic cancer - Coagulopathy - Dementia - Complicated Diabetes - Fluid electrolyte disorder - Heart failure - Hypertension - Hemiplegia - HIV/AIDS - Liver disease - Vascular disease - Psychosis - Pulmonary circulation disorder - Chronic pulmonary disease

		- Renal failure - Weight loss
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Final Models		
Paper	Program	Code
Table 1	SAS	<pre>proc freq data=input; tables %covars; by gbtm_group; run;</pre>
Table 2	Stata	<pre>mlogit gbtm_traj_group ib0.cap ib0.comorbidity_count ib4.age_group_n ib1.sex_n ib8.race_n ib1.rural_urban_status_n ib2.scope_of_benefit_n ib1.medicaid_mco_n ib1.medicaid_elig_cat_n ib0.tobacco_use_disorder ib0.alcohol_use_disorder ib0.non_opioid_sud ib0.serious_mental_illness ib0.inpatient_visits ib0.ed_use ib2010.year ib1.policy_restriction ib0.medicaid_coverage_policy, base(4) margins cap,atmeans mlogit, rrr</pre>
Figure 1	SAS	<pre>proc traj data= input out=bupe_model_out52 outstat=bupe_stat52 outplot=bupe_plot52 ci95m; var buprenorphine_0-buprenorphine_12; /* MOUD outcome during followup */ indep month_0-month_12; /* variables for time during followup months*/ model logit; /*we have binary outcome, so this should be LOGIT*/ ngroups 5; /*repeat model changing number of groups sequentially from 2 to 6*/ order 2 2 2 2 2; /*specifies functional form for the trajectory shape */ run; %trajplotnew (bupe_plot52,bupe_stat52, "Buprenorphine Use vs. Months since index", "Five Group-logit Model with quadratic form","Lambda","Time"); proc sgplot data=input; styleattrs datacontrastcolors=(red green blue black BIOY) datalinepatterns=(DashDashDot); series x=T y=COL1 / group=Average lineattrs = (thickness = 3) name="series"; xaxis label="Months since index date" integer values=(0 to 12 by 1); yaxis label="Proportion of beneficiaries receiving Buprenrphine" integer values=(0.0 to 1.0 by 0.1); keylegend "series"/location=outside position=bottomleft; run;</pre>
Figure 2	SAS	<pre>twoway (bar margins groupcap if group==1, bcolor(red)) /// (bar margins groupcap if group==2, bcolor(green)) /// (bar margins groupcap if group==3, bcolor(blue)) /// (bar margins groupcap if group==4, bcolor(black)) /// (bar margins groupcap if group==5, bcolor(gold)) /// (rcap cul cll groupcap), /// legend(order(1 "Gradual Decline" 2 "Early Discontinuation" 3 "Delayed Discontinuation" 4 "Consistent Use" 5 "Rebounding Use")) /// xlabel(0 "No CAP" 1 "CAP" 3 "No CAP" 4 "CAP" 6 "No CAP" 7 "CAP" "No CAP" 10 "CAP"12 "No CAP" 13 "CAP", noticks)</pre>