

Online-only Supplement

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Table S1. ICD-9 or CPT Codes Used to Identify Conditions, Therapy and Testing Services

Diseases, Conditions, Treatment	ICD-9 codes or CPT codes
Opioid use disorder	ICD-9 codes: 304.0x, 304.7x, 305.5x
Non-opioid use drug disorders	ICD-9 diagnosis of dependence on illicit substances other than opioids (cocaine, cannabis, amphetamine, hallucinogen, other sedatives and other substances), or a diagnosis of "drug dependence complicating pregnancy/childbirth/puerperium", "antepartum drug dependence", "maternal drug dependence at delivery", or "postpartum drug dependence": 304.20, 304.21, 304.22, 304.23, 305.60, 305.61, 305.62, 304.30, 304.31, 304.32, 304.33, 305.20, 305.21, 305.22, 304.40, 304.41, 304.42, 304.43, 305.70, 305.71, 305.72, 304.50, 304.51, 304.52, 304.53, 305.30, 305.31, 305.32, 304.10, 304.11, 304.12, 304.13, 305.40, 305.41, 305.42, 304.60, 304.61, 304.62, 304.80, 304.81, 304.82, 304.90, 304.91, 304.92, 304.63, 304.83, 304.93, 305.80, 305.81, 305.82, 305.90, 305.91, 305.92, 648.30, 648.33, 648.31, 648.32, 648.34
Alcohol use disorders	ICD-9 codes: 303.90, 303.91, 303.92, 303.93, 305.00, 305.01, 305.02
Mental health disorders	Schizophrenia/Schizoaffective: ICD-9 295.0x-295.9x; Bipolar/Manic Disorders: ICD-9 296.0x, 296.1x, 296.4x, 296.5x, 296.6x, 296.7x, 296.80, 296.81, 296.82, 296.89, 301.13; Depression: ICD-9 296.2x, 296.3x, 300.4x, 311
Tobacco use	Tobacco use disorder or tobacco use disorder with complicating pregnancy: ICD-9 codes: 305.1, 649.00, 649.01, 649.02, 649.03, 649.04; Personal history of tobacco use: V15.82
Adverse pregnant history	History of preterm labor or delivery or other high-risk pregnancy: ICD-9 codes V1321, V2341, V230, V231, V232, V2342, V2349, V235
Methadone opioid agonist therapy	CPT codes: H0020 and J1230
Behavioral counseling	CPT codes: H0001, H0004, H0005, H0006, H0007, H0008, H0012, H0013, H0014, H0015, H0028, H0047, H0049, H0050, H2034, H2035, H2036, T1006, W0120, W0137, W0138, W0139, W0140, W0141, W0142, W0143, W0144, W0147, W0858, W0859, W1855, W5964, W6039, W9971
Urine drug test	CPT codes: 82660, H0003, Z2103, Z2104, Z2105, Z2106, G0430, 80104, 80100, 80101, 80299, 83925, H0048, G0431, G0434

Table S2. Final 6-Group Group-Based Trajectory Model for Buprenorphine Refill Patterns

Group (Pattern over time)	Estimate	Standard Error	t	P Value
Early initiation with persistently high adherence				
Intercept	-1.47	0.042	-35.3	<0.0001
Linear	16.6	0.295	56.3	<0.0001
Quadratic	-23.63	0.437	-54.1	<0.0001
Cubic	14.68	0.245	59.9	<0.0001
Quartic	-4.06	0.059	-68.9	<0.0001
Quintic	0.41	0.005	78.5	<0.0001
Early initiation with moderate-to-high adherence				
Intercept	-3.27	0.080	-40.8	<0.0001
Linear	-0.08	0.378	-0.20	0.84
Quadratic	9.04	0.611	14.8	<0.0001
Cubic	-6.61	0.406	-16.3	<0.0001
Quartic	1.77	0.118	15.0	<0.0001
Quintic	-0.17	0.01	-13.5	<0.0001
Early initiation with declining adherence				
Intercept	-1.22	0.037	-32.9	<0.0001
Linear	6.67	0.152	44.0	<0.0001
Quadratic	-5.34	0.169	-31.5	<0.0001
Cubic	1.55	0.069	22.4	<0.0001
Quartic	-0.16	0.009	-17.2	<0.0001
Early initiation with early discontinuation				
Intercept	-1.66	0.039	-42.3	<0.0001
Linear	7.97	0.235	33.9	<0.0001
Quadratic	-14.78	0.434	-34.1	<0.0001
Cubic	9.66	0.325	29.8	<0.0001
Quartic	-2.85	0.104	-27.4	<0.0001
Quintic	0.32	0.012	26.4	<0.0001
Late initiation with moderate-to-high adherence				
Intercept	-3.32	0.018	-187.1	<0.0001
Linear	-17.48	0.38	-46.5	<0.0001
Quadratic	27.4	0.37	75.0	<0.0001
Cubic	-13.12	0.11	-115.1	<0.0001
Quartic	2.52	0.015	164.1	<0.0001
Quintic	-0.17	0.002	-68.9	<0.0001
Late initiation with low-to-moderate adherence				
Intercept	-4.85	0.044	-109.7	<0.0001
Linear	15.53	0.086	180.5	<0.0001
Quadratic	-31.82	0.134	-237.3	<0.0001
Cubic	22.74	0.04	552.1	<0.0001
Quartic	-6.48	0.014	-453.9	<0.0001
Quintic	0.64	0.02	293.1	<0.0001

Table s3. Nagin's Diagnostic Criteria for Group-Based Trajectory Model

Group	N	Model Estimate of Group Probability (95% CI) ^a	Proportion Classified in Group ^b	Average Posterior Probability (median, min, max) ^c	No (%) of women with posterior probability <0.95 for the assigned trajectory	Odds Correct Classification ^d
Early initiation with persistently high adherence	747	0.316 (0.298, 0.335)	31.6299	0.999 (1.00)	5 (0.13%)	0.316
Early initiation with moderate-to-high adherence	357	0.151 (0.137, 0.166)	15.1190	0.996 (1.00)	6 (1.7%)	0.151
Early initiation with declining adherence	248	0.105 (0.926, 0.118)	10.5090	0.996 (1.00)	4 (1.6%)	0.105
Early initiation with early discontinuation	393	0.166 (0.151, 0.181)	16.6412	0.999 (1.00)	1 (0.025%)	0.167
Late initiation with moderate-to-high adherence	318	0.135 (0.121, 0.149)	13.5104	0.999 (1.00)	2 (0.31%)	0.135
Late initiation with low-to-moderate adherence	298	0.126 (0.112, 0.139)	12.5904	0.997 (1.00)	3 (1.01%)	0.126

^a 95% confidence intervals (CIs), based on parametric bootstrap method, should be reasonably narrow.

^b Proportion classified in group is based on the maximum posterior probability rule. The values of the proportion classified in the group should be similar to the model estimates of group probabilities in the second column.

^c Average posterior probability is obtained by averaging the posterior probabilities for a given group for all individuals placed in this group by the maximum posterior probability rule. Acceptable values for this criterion are 0.7 or greater for all groups.

^d Acceptable values of the odds correct classification are 5.0 or greater for all groups.

Table S4. Factors Associated with Specific Buprenorphine Trajectories: Multivariate Multinomial Logistic Regression

Trajectory Group (Reference: Early initiator with persistent high adherence)	Early initiators			Late initiators	
	Moderate-to-high adherence (n=357)	Declining adherence (n=248)	Early discontinuation (n=393)	Moderate-to-high adherence (n=318)	Low-to-moderate adherence (n=298)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sociodemographics					
Age, year	0.98 (0.95, 1.01)	0.98 (0.95, 1.01)	0.94 (0.91, 0.97)[¶]	0.98 (0.95, 1.02)	0.96 (0.92, 0.99)[*]
Non-white race (ref=white)	0.97 (0.48, 1.95)	1.78 (0.92, 3.41)	2.16 (1.22, 3.82)[§]	0.48 (0.20, 1.16)	1.06 (0.51, 2.19)
Eligible through pregnancy (ref=TANF/others)	2.13 (1.35, 3.37)[§]	0.69 (0.36, 1.34)	1.41 (0.87, 2.28)	2.31 (1.43, 3.72)[§]	1.63 (0.98, 2.72)
Resided in non-metropolitan counties (ref=metropolitan counties)	1.49 (1.08, 2.05)[*]	1.40 (0.98, 2.02)	1.02 (0.72, 1.44)	1.59 (1.12, 2.25)^{**}	1.50 (1.04, 2.15)[*]
Health-Status					
OUD	1.14 (0.76, 1.72)	0.67 (0.45, 0.99)[*]	0.59 (0.42, 0.84)[*]	0.88 (0.58, 1.34)	1.00 (0.65, 1.54)
Other non-opioid drug use disorders	0.98 (0.70, 1.39)	0.75 (0.52, 1.06)	0.72 (0.53, 0.99)[*]	0.95 (0.66, 1.37)	1.13 (0.77, 1.64)
Alcohol use disorders	0.59 (0.29, 1.20)	0.79 (0.38, 1.67)	0.32 (0.14, 0.73)^{**}	1.37 (0.73, 2.58)	0.80 (0.40, 1.61)
Prior buprenorphine use (ref=no MAT therapy)	0.09 (0.06, 0.13)[¶]	0.41 (0.21, 0.64)[¶]	0.16 (0.11, 0.24)[¶]	0.04 (0.03, 0.06)[¶]	0.05 (0.03, 0.07)[¶]
Prior methadone use (ref= no MAT therapy)	0.66 (0.23, 1.86)	1.12 (0.29, 4.30)	1.07 (0.35, 3.26)	0.85 (0.31, 2.35)	0.67 (0.22, 2.00)
Prior buprenorphine/methadone use	0.09 (0.05, 0.16)[¶]	0.45 (0.24, 0.84)[*]	0.13 (0.07, 0.24)[¶]	0.06 (0.03, 0.11)[¶]	0.04 (0.02, 0.09)[¶]
Tobacco use	1.12 (0.83, 1.53)	0.83 (0.60, 1.14)	0.80 (0.60, 1.06)	1.19 (0.85, 1.67)	0.96 (0.69, 1.34)

Table S4 (Continued).

Trajectory Group (Reference: Early initiator with persistent high adherence)	Early initiators			Late initiators	
	Moderate-to-high adherence (n=357)	Declining adherence (n=248)	Early discontinuation (n=393)	Moderate-to-high adherence (n=318)	Low-to-moderate adherence (n=298)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Patterns of Health Services Use & Care during Pregnancy					
Prior hospitalization	1.22 (0.73, 2.05)	2.13 (1.27, 3.58)**	2.14 (1.34, 3.44)**	1.39 (0.81, 2.41)	2.49 (1.50, 4.15)¶
No. ED visits	1.04 (1.00, 1.08)	1.04 (1.00, 1.09)	1.08 (1.04, 1.12)¶	1.04 (1.00, 1.09)	1.09 (1.05, 1.14)¶
No. Outpatient visits	0.99 (0.97, 1.00)	0.97 (0.84, 0.99)**	0.96 (0.94, 0.98)¶	0.98 (0.97, 1.00)	0.95 (0.93, 0.97)¶
No. monthly other prescriptions	1.02 (0.99, 1.06)	0.99 (0.95, 1.03)	1.02 (0.99, 1.05)	1.00 (0.96, 1.04)	0.97 (0.93, 1.01)
Mean buprenorphine daily dose	0.94 (0.92, 0.97)¶	0.95 (0.92, 0.98)¶	0.93 (0.90, 0.95)¶	0.94 (0.91, 0.97)¶	0.92 (0.90, 0.95)¶
No. buprenorphine prescribers	1.14 (1.00, 1.30)*	1.08 (0.93, 1.25)	0.43 (0.35, 0.55)¶	0.82 (0.69, 0.97)*	0.60 (0.48, 0.74)¶
Having behavioral counseling	1.20 (0.90, 1.61)	1.06 (0.76, 1.47)	1.25 (0.92, 1.68)	1.32 (0.96, 1.81)	1.27 (0.91, 1.76)

*: P <.05; **: P <.01; ‡: P <.001; ¶: P <.0001

Abbreviations: OUD: opioid use disorders; TANF: Temporary Assistance for the Needy Families

Table S5. Factors Associated with Specific Buprenorphine Trajectories: Multivariate Multinomial Logistic Regression (Sensitivity Analysis Excluding Health Services Use Factors)

	Early initiators			Late initiators	
Trajectory Group (Reference: Early initiator with persistent high adherence)	Moderate-to-high adherence (n=357)	Declining adherence (n=248)	Early discontinuation (n=393)	Moderate-to-high adherence (n=318)	Low-to-moderate adherence (n=298)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sociodemographics					
Age, year	0.98 (0.95, 1.01)	0.98 (0.94, 1.01)	0.94 (0.92, 0.97)[¶]	0.98 (0.95, 1.01)	0.96 (0.92, 0.99)[*]
Non-white race (ref=white)	1.05 (0.52, 2.11)	1.91 (1.01, 3.65)[*]	2.52 (1.44, 4.41)[§]	0.51 (0.22, 1.23)	1.19 (0.58, 2.43)
Eligible through pregnancy (ref=TANF/others)	1.96 (1.24, 3.08)[§]	0.65 (0.34, 1.26)	1.25 (0.78, 2.01)	2.22 (1.39, 3.55)[§]	1.58 (0.96, 2.60)
Resided in non-metropolitan counties (ref=metropolitan counties)	1.39 (1.02, 1.90)[*]	1.26 (0.89, 1.80)	0.87 (0.62, 1.22)	1.50 (1.07, 2.11)^{**}	1.34 (0.95, 1.90)
Health-Status					
ODD	1.13 (0.75, 1.70)	0.65 (0.44, 0.96)[*]	0.58 (0.41, 0.81)[*]	0.87 (0.57, 1.32)	0.96 (0.63, 1.46)
Other non-opioid drug use disorders	1.00 (0.71, 1.40)	0.74 (0.52, 1.05)	0.73 (0.54, 0.99)[*]	0.97 (0.67, 1.39)	1.12 (0.77, 1.61)
Alcohol use disorders	0.68 (0.34, 1.36)	0.93 (0.45, 1.93)	0.42 (0.19, 0.95)^{**}	1.55 (0.83, 2.88)	1.01 (0.51, 2.01)
Prior buprenorphine use (ref=no MAT therapy)	0.09 (0.06, 0.13)[¶]	0.42 (0.27, 0.66)[¶]	0.17 (0.12, 0.24)[¶]	0.04 (0.03, 0.06)[¶]	0.05 (0.03, 0.07)[¶]
Prior methadone use (ref= no MAT therapy)	0.66 (0.23, 1.88)	1.10 (0.29, 4.18)	1.16 (0.39, 3.44)	0.84 (0.31, 2.29)	0.70 (0.24, 2.06)
Prior buprenorphine/methadone use	0.10 (0.06, 0.17)[¶]	0.50 (0.27, 0.91)[*]	0.14 (0.07, 0.25)[¶]	0.06 (0.03, 0.11)[¶]	0.05 (0.02, 0.10)[¶]
Tobacco use	1.18 (0.87, 1.60)	0.86 (0.63, 1.17)	0.86 (0.65, 1.14)	1.25 (0.89, 1.74)	0.98 (0.71, 1.36)

Table S5 (Continued).

Trajectory Group (Reference: Early initiator with persistent high adherence)	Early initiators			Late initiators	
	Moderate-to-high adherence (n=357)	Declining adherence (n=248)	Early discontinuation (n=393)	Moderate-to-high adherence (n=318)	Low-to-moderate adherence (n=298)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Patterns of Care during Pregnancy					
Mean buprenorphine daily dose	0.95 (0.92, 0.97)[¶]	0.95 (0.93, 0.98)[¶]	0.93 (0.91, 0.96)[¶]	0.94 (0.92, 0.97)[¶]	0.93 (0.90, 0.95)[¶]
No. buprenorphine prescribers	1.13 (0.99, 1.29)	1.05 (0.91, 1.22)	0.43 (0.34, 0.54)[¶]	0.81 (0.69, 0.96)[*]	0.57 (0.46, 0.71)[¶]
Having behavioral counseling	1.23 (0.93, 1.65)	1.04 (0.75, 1.43)	1.24 (0.92, 1.66)	1.33 (0.97, 1.82)	1.19 (0.86, 1.65)

*: P <.05; **: P <.01; §: P <.001; ¶: P <.0001

Abbreviations: OUD: opioid use disorders; TANF: Temporary Assistance for the Needy Families

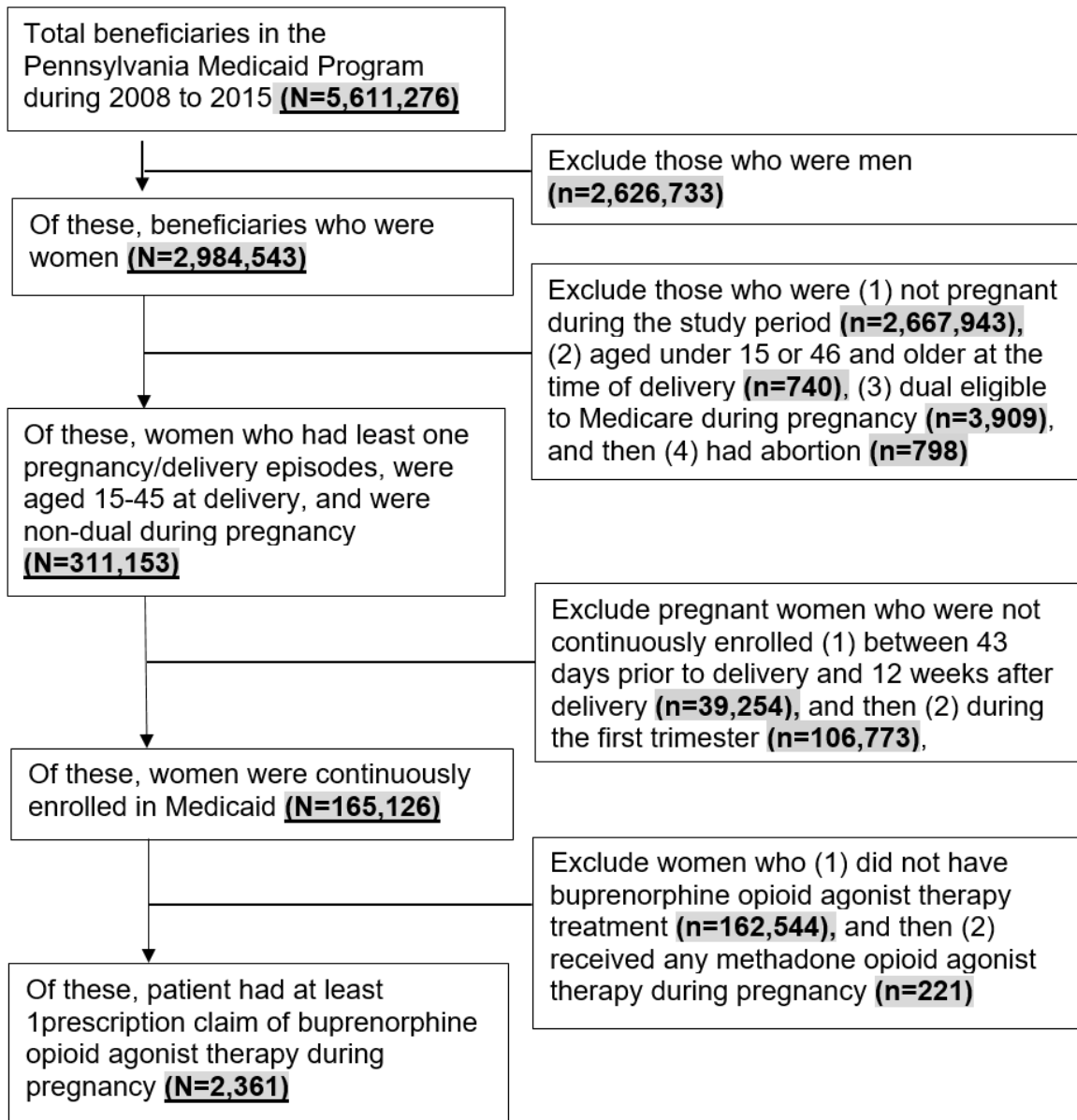


Figure S1. Sample Size Flow Chart

Note: Among the final 2,361 women, if there were multiple pregnancies during the study period with at least 1 buprenorphine fill in each pregnancy, we considered their first pregnancy only.