Supplementary Online Content

eAppendix 1. Cohort Selection

eAppendix 2. Supplementary Methods

eFigure 1. Definition of OUD

eFigure 2. Cohort Inclusion and Timeline

eFigure 3. Alluvial Flow of OUD Treatment Pathways in the Initial Cohort

eTable. Censoring by Baseline Characteristics

eAppendix 1. Cohort Selection

We included individuals ≥16 years with OUD; with commercial or Medicare Advantage medical, pharmacy and behavioral coverage; and contiguous enrollment for three months before and after OUD treatment initiation date. For those in the No Treatment pathway we assigned a date selected at random from the treated pathways. We identified OUD as ≥1 inpatient or ≥2 outpatient claims for ICD-9/10 diagnosis codes for opioid dependence occurring within 3 months of each other; or ≥1 claims for diagnosis codes for opioid dependence, opioid use, or opioid abuse plus diagnosis codes for an encounter related to opioid overdose or an injection-related infection, or claims for medication for opioid use disorder or detoxification.

eAppendix 2. Supplementary Methods

We used adjudicated medical and pharmacy claims for OUD treatment to identify the most common OUD treatment pathways. We initially described the sequence of services in weekly and then monthly (4-week) time intervals over the first 3 months following cohort entry. Of particular interest were the following types of services: inpatient detoxification or rehab, MOUD with buprenorphine/methadone or naltrexone and outpatient behavioral health (BH) visits. We further broke down behavioral health visits into intensive (including intensive outpatient services or partial hospitalization) and other types of BH.

The weekly and monthly analysis of treatment sequence identified 12,843, and 336 different combinations of treatment modalities over 12 weeks (figure S1). We used the monthly view of treatments to visually cluster treatment sequence into "treatment buckets" taking into account the frequency of patterns and a hierarchy of services. We also ran a latent Markov model as a confirmatory step to rule out possibility of non-obvious patterns.

There was substantial variation in treatment pathways provided to OUD patients (336 different combination based on monthly view of the data). BH without medication or inpatient detoxification was the most common pattern (57%) followed by buprenorphine/methadone (with or without BH, 19%) and inpatient detoxification or rehab (with or without medication 15%). Six per cent of patients received no type of OUD treatment over the initial 12 weeks (figure S1), Only 5.1% of patient who were initiated on non-medication treatments were later provided MOUD.

eFigure 1. Definition of OUD

	Opioid Claim	ICD-9/ICD-10 Code for Dependence, Abuse or Use	Cohort Entry Date
A A	Dependence	• ≥ 2 outpatient that occur within 3 months of each other Or ≥ 1 inpatient dependence claim • Either of above does not occur during long-term prescribed opioid episode	1st dependence claim date

Reference: Larochelle MR, Liebschutz JM, Zhang F, Ross-Degnan D, Wharam JF.

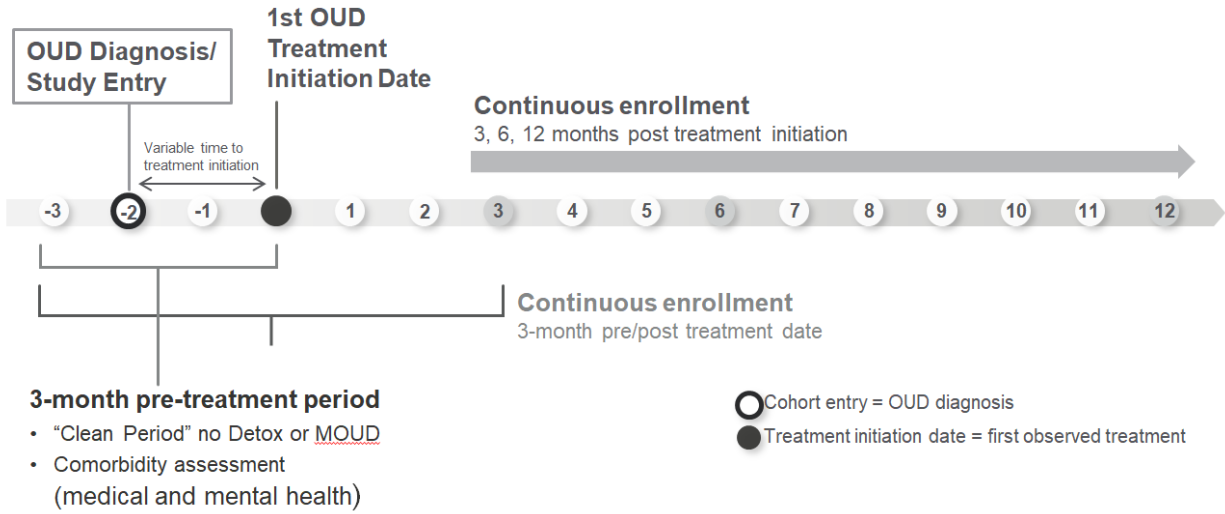Opioid Prescribing After Nonfatal Overdose and Association With Repeated

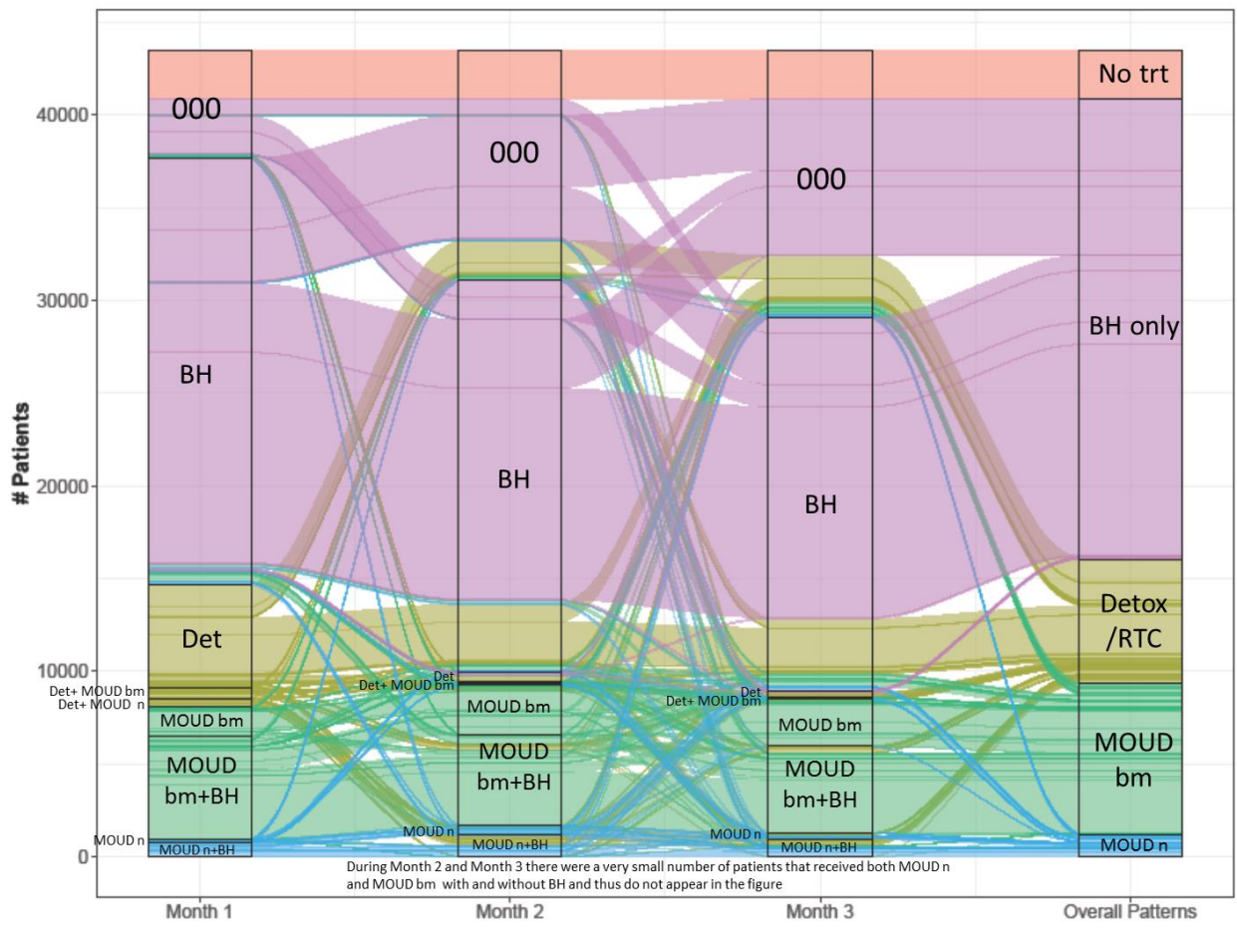|			
	Overdose. *Annals Of Internal Medicine*. 2016;165(5):376-377. doi:10.7326/L16-0168		

B	Dependence
	
	Use or
	
	Abuse
		+	- ≥1 Opioid dependence, abuse or use claim
			
			- Has one of the following confirmatory diagnoses or events at any time in the study period:
			- Evidence of opioid overdose
			- Evidence of MOUD
			- Opioid-related detox or rehab stay
			- Hep C
			- Infectious episode
			   - Endocarditis
			   - Abscess/cellulitis
			   - Phlebitis
			   - Infectious arthritis
			
			- Claim and confirmatory diagnosis must:
			- occur within 3 months of each other
				First date of two components

	and
	
	    - can occur in either order (e.g,
	
	      confirmatory dx can be 1st or 2nd)	

eFigure 2. Cohort Inclusion and Timeline

OUD pathways study timeline by month

3-month pre-treatment period
- "Clean Period" no Detox or MOUD
- Comorbidity assessment
  (medical and mental health)

○ Cohort entry = OUD diagnosis
● Treatment initiation date = first observed treatment

eFigure 3. Alluvial Flow of OUD Treatment Pathways in the Initial Cohort

Legend key: 000 – no inpatient detox, BH or medication, BH: outpatient behavioral visits only,

Det: inpatient detoxification or rehabilitation, MOUD bm: MOUD buprenorphine/methadone,

MOUD n: MOUD naltrexone

eTable. Censoring by Baseline Characteristics

Variable	Levels	N =40,885	Not Censored N=21,200	Censored Q2 N=7,336	Censored Q3 N=6,811	Censored Q4 N=5,538
Total Sample			52%	18%	17%	14%
Column %		%	%	%	%	%
Age Group	16-25	15	16	13	13	14
	26-34	13	10	18	15	14
	35-44	15	14	18	15	14
	45-54	18	19	17	16	16
	54-64	22	23	**18**	21	22
	>=65	18	18	**16**	19	20
Gender	Female	46	47	43	46	46
	Male	54	53	**57**	54	54
Insurance type	Commercial	58	55	**66**	60	57
	MA<65	25	**28**	19	22	25
	MA≥65	17	17	15	18	19
Race/ethnicity	White	74	75	73	73	73
	Black	12	12	12	12	12
	Hispanic	8	8	8	8	9
	Other/unknown	5	4	7	7	6
Elixhauser-medical (mean score)		1.7	1.7	1.7	1.8	1.8
Mental Health Comorbidities	Depression	24	24	25	24	23
	Anxiety	26	25	28	27	26
	ADHD	4	4	4	5	4
	PTSD	4	3	4	4	3

	Alcohol	10	10	11	11	10
	Bipolar	8	8	7	8	7
	Psychosis	4	4	4	3	4
Indicators of Severity	IVDU infection	14	14	13	14	13
	Hepatitis C	5	5	4	5	5
	Overdose	5	5	6	5	6