

Background

- The opioid epidemic remains a public health crisis with more than 100,000 overdose-related deaths reported by the Center for Disease Control (CDC) in 2021 (1).
- The State of Michigan passed laws to enforce opioid prescribing procedures to ensure safer practice measures to reduce subsequent opioid misuse when treating chronic pain (2-4).
- Opioid-related deaths have not decreased, resulting in an economic and public health burden from the ongoing number of fatal opioid overdoses (5).
- Patients with opioid use disorder (OUD) and polysubstance use require long term follow-up care when suffering with addiction.
- Understanding the disposition of patients who are admitted to hospitals may enhance our understanding of how to better ensure these patients get the most appropriate care.
- This study set out to evaluate whether the disposition of patients diagnosed with OUD or polysubstance use is linked to patient insurance provider, other social determinants of health (SDOH), or changes in hospitalization or disposition as a result of implementation of Michigan's opioid prescribing laws.

Methods

- Data were abstracted from the State Inpatient Database (SID) and the National Inpatient Sample (NIS) database from 2016-2017 (pre-Michigan prescribing laws era, or 'pre-era') and 2018-2019 (post-Michigan prescribing laws era, or 'post-era').
- Multinomial logistic regression analysis with odds ratios and 95% confidence intervals was used to determine associations between patient disposition, insurance provider, and SDOH for inpatients who have an OUD only diagnosis or patients who have OUD and any other concurrent substance use (polysubstance use) disorders based on ICD-10 codes F10-F19.
- Possible patient disposition included routine, transferred to skilled nursing facilities or home health care (SNF/HHC), against medical advice (AMA), and mortality. Insurance provider included Medicare, Medicaid, or private insurance. SDOH such as family support, housing access, education, and unemployment was also included as

Results

variables	Pre MI Law Era 2016-2017						Post MI Law Era 2018-2019					
	Opioid alone diagnosis			OUD and Polysubstance Use			Opioid alone diagnosis			OUD and Polysubstance Use		
	female	male	p-value*	female	male	p-value*	female	male	p-value*	female	male	p-value*
Disposition			<.0001*, <.0001**			<.0001*, <.0001**			<.0001*, <.0001**			<.0001*, <.0001**
Routine	16,941	15,884		11,666	12,582		14,729	13,950		10,111	10,823	
Transfer to Short-term Hospital	537	578		382	440		501	521		364	383	
Transfer : SNF	4,055	3,844		2,219	2,690		3,837	3,668		1,923	2,463	
Home Health Care Against Medical Advice	3,584	2,622		1,622	1,489		3,390	2,495		1,560	1,368	
Died	1,731	1,988		1,441	1,696		1,668	1,929		1,415	1,677	
Died	362	390		218	250		364	408		211	252	

Table 1. SID patient disposition distribution comparison of females vs males and OUD alone vs OUD and polysubstance use pre and post implementation of MI opioid prescribing laws. * = main effect of distribution, ** = main effect of distribution by sex

	SID Disposition for OUD Alone: Odds Ratio (95% CI for OR)			SID Disposition for OUD and Polysubstance Use: Odds Ratio (95% CI for OR)		
	Transfer: SNF, HHC (reference= Routine)	AMA (reference= Routine)	Mortality (reference=Routine)	Transfer: SNF, HHC (reference=Routine)	AMA (reference=Routine)	Mortality (reference=Routine)
Ref=Medicare						
Medicaid	0.43 (0.41,0.44)*	2.42 (2.28,2.58)*	0.78 (0.70,0.87)*	0.56 (0.53,0.58)*	2.10 (1.96,2.25)*	0.91 (0.79,1.06)
Private	0.49 (0.47,0.51)*	1.43 (1.32,1.55)*	0.62 (0.53,0.72)*	0.59 (0.56,0.62)*	1.32 (1.21,1.44)*	0.56 (0.45,0.69)*
Mlaw(ref=No)	2.72 (0.62, 11.95) when Family Support Issues	2.72 (2.19, 3.38)* when Family Support Issues	2.72 (1.69, 4.38)* when Family Support Issues	2.72 (0.62, 11.95) when Family Support Issues	2.72 (2.49, 2.96)* when Family Support Issues	2.72 (0.46, 15.92) when Family Support Issues
Gender (ref=male)	1.06 (1.03,1.09)*	0.80 (0.76,0.84)*	0.80 (0.72,0.88)*	0.97 (0.94,1.01)	0.87 (0.82,0.92)*	0.84 (0.74,0.96)*
Unemployment	0.62 (0.51,0.76)*	0.87 (0.66,1.15)	0.21 (0.05,0.83)*	0.75 (0.61,0.91)*	0.85 (0.64,1.12)	0.13 (0.02,0.95)*
Housing Issues	0.74 (0.68,0.80)*	1.16 (1.05,1.29)*	0.26 (0.16,0.41)*	0.85 (0.79,0.93)*	1.11 (0.99,1.23)	0.28 (0.17,0.46)*
Social Environment	1.21 (1.07,1.38)*	0.61 (0.44,0.85)*	0.27 (0.10,0.71)*	1.17 (0.98,1.38)	0.64 (0.44,0.91)*	0.24 (0.06,0.98)*
Psychosocial	0.34 (0.27,0.43)*	0.31 (0.22,0.46)*	0.32 (0.12,0.85)*	0.36 (0.29,0.46)*	0.30 (0.21,0.44)*	0.39 (0.15,1.06)
Healthcare Access	4.67 (2.45,8.89)*	1.00 (0.23,4.39)	<0.001 (<0.001,>999.999)	6.44 (3.12,13.30)*	1.38 (0.30,6.32)	<0.001 (<0.001,>999.999)

Table 2. SID multinomial logistic regression of patient disposition for OUD alone vs OUD and polysubstance use pre and post implementation of MI with insurance payer and social determinants of health.

	NIS Disposition for OUD Alone: Odds Ratio (95% CI for OR)			NIS Disposition for OUD and Polysubstance Use: Odds Ratio (95% CI for OR)		
	Transfer: SNF, HHC (reference= Routine)	AMA (reference= Routine)	Mortality (reference=Routine)	Transfer: SNF, HHC (reference=Routine)	AMA (reference=Routine)	Mortality (reference=Routine)
Ref=Medicare						
Medicaid	0.33 (0.32,0.34)*	2.00 (1.94,2.06)*	0.54 (0.51,0.57)*	0.43 (0.42,0.45)*	1.69 (1.63,1.75)*	0.68 (0.63,0.73)*
Private	0.40 (0.39,0.41)*	1.12 (1.06,1.18)*	0.55 (0.51,0.59)*	0.46 (0.44,0.49)*	1.07 (1.01,1.13)*	0.62 (0.55,0.68)*
Mlaw(ref=No)	1.14 (1.10,1.18)* when Healthcare access issues	1.16 (1.10,1.23)* when Healthcare access issues	1.12 (1.05,1.19)* when Healthcare access issues	1.09 (0.76, 1.57) when Healthcare access issues	1.60 (0.75, 3.44) when Healthcare access issues	1.12 (1.03, 1.21)* when Healthcare access issues
Gender (ref=male)	1.07 (1.06,1.09)*	0.73 (0.71,0.75)*	0.77 (0.73,0.81)*	1.00 (0.98,1.02)	0.81 (0.79,0.83)*	0.77 (0.72,0.82)*
Unemployment	0.69 (0.61,0.77)*	0.96 (0.79,1.16)	0.10 (0.05,0.18)*	0.74 (0.66,0.83)*	0.92 (0.76,1.12)	0.13 (0.07,0.23)*
Housing Issues	0.79 (0.76,0.82)*	1.24 (1.19,1.30)*	0.39 (0.34,0.45)*	0.88 (0.85,0.92)*	1.13 (1.08,1.18)*	0.44 (0.38,0.51)*
Social Environment	0.94 (0.77,1.14)	0.83 (0.68,1.03)	0.21 (0.09,0.52)*	0.87 (0.69,1.10)	0.81 (0.65,0.99)*	0.21 (0.07,0.65)*
Psychosocial	0.54 (0.46,0.63)*	0.74 (0.54,1.01)	0.19 (0.10,0.37)*	0.59 (0.50,0.69)*	0.72 (0.52,1.00)	0.20 (0.09,0.42)*
Family Support	0.60 (0.55,0.65)*	0.47 (0.39,0.55)*	0.22 (0.13,0.38)*	0.66 (0.60,0.73)*	0.44 (0.37,0.52)*	0.25 (0.13,0.46)*

Table 3. NIS multinomial logistic regression of patient disposition for OUD alone vs OUD and polysubstance use pre and post implementation of MI with insurance payer and social determinants of health.

- Across the entire study period in Michigan, insurance status significantly predicted disposition for those with OUD and those with combined OUD and polysubstance use, with the odds of being transferred to SNF/HHV instead of routine discharge lower for patients with Medicaid versus Medicare [OR =0.43, 95% CI: 0.41, 0.44, OR= 0.56(0.56, 0.62) respectively].
- For patients with OUD or OUD and polysubstance use, the odds of transfer to SNF/HHC versus discharged routine was lower for patients with private insurance versus Medicare [OR=0.49 (0.47, 0.51), OR=0.59 (0.56, 0.62) respectively].
- For patients with OUD or OUD and polysubstance use, odds were higher of being discharged AMA versus discharged routinely when using Medicaid versus Medicare [OR=2.42 (2.28, 2.58), OR=2.10 (1.96, 2.25) respectively]. For OUD or OUD and polysubstance use, the odds of mortality versus routine disposition were lower for those with private insurance versus Medicare [OR=0.62 (0.53, 0.71), OR=0.56 (0.45, 0.69) respectively].

Conclusions

- For both the SID and NIS, of the patients admitted with OUD alone or OUD and polysubstance use disorders, most were discharged routine for both timeframes 2016-2017 (pre-era) and 2018-2019 (post-era).
- For patients with OUD alone, as well as for patients with OUD and polysubstance use, insurance provider had associations with whether a patient was transferred to SNF/HHC, or if a patient was discharged AMA or died.
- Patients with Medicare were more likely to be transferred compared to those with Medicaid, which could be confounded by the fact that patients on Medicare are older and potentially sicker.
- SID data reviewed after implementation of Michigan Prescribing Laws, showed that patients with OUD alone or OUD and polysubstance use who also had issues surrounding family support had higher odds of an AMA disposition or experienced a higher risk of mortality.
- The limitation of the SID is understanding whether those discharged routinely were offered and declined additional support for their OUD and the frequency to which they were readmitted for their OUD and/or substance use disorder.

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