



TYPOLGIZING PATIENTS WITH OVERDOSE OR OPIOID USE DISORDER IN ACUTE CARE SETTINGS

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A Syndromic Exploration of the Opioid Syndemic



- People with OUD are not homogenous:
 - *Philly: 50,000 use heroin; <2,000 street homeless*
 - *Some recently transitioned to injection; others have injected drugs for decades*
- Settings for drug use differ and **settings – ie, the risk environment – determines harms**
- Understanding syndromic patterning is essential to developing targeted interventions



- The U.S. is experiencing multiple interrelated and often synergistic opioid-related epidemics
- These include overdose, HCV, infections, but also injuries like anoxia/hypoxia, trauma
- This complexity is source of suffering, cost and confusion

Objectives

1. Describe the medical complexity of people with diagnosed OUD or overdose presenting for urgent, emergency & trauma admissions in Philadelphia
2. Typologize their conditions, demographics and admission characteristics
3. Explore the prevalence and patterning of pain across the patient types

Methods

- PHC4 Data
- Data management in SAS: long->wide with looping diagnostic categorizations
- Descriptive analysis of diagnosis patterning across demographic groups
- Refine categorization schema with clinicians
- Conduct preliminary latent class analysis

Data

Discharge data (PHC4) from
Philadelphia in 2017



Wide range of variables

Demographics

Insurance
type

Charges

Diagnostic
Codes

- 303,146 discharges total
- Inclusion criteria:
 - *ICD10 for overdose or OUD*
 - *15 < age < 65*
 - *Urgent, emergency, trauma*
- 10,349 admissions among 7,786 unique patients
 - *\$800 million in charges*

Data

Discharge data (PHC4) from
Philadelphia in 2017



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- Covers admissions across all county healthcare facilities
 - *In our population, some individuals were discharged as many as 21 times from as many as 8 different facilities*
- Value in understanding how diagnoses relate to characteristics of admissions and discharges

Categorization

- Created 30 indicator categories, for example:
 - *Chronic pain*
 - *Anoxic brain injury*
 - *Superficial Infection (e.g., abscess, cellulitis)*
 - *Systematic Infection (e.g., sepsis, bacteremia)*
 - *Pervasive Infection (e.g., osteomyelitis, infective endocarditis)*
- Refine categorization schema with clinicians (medical student, one emergency medicine and toxicology, one family medicine, one hospitalist MD*, one nurse with experience treating injection-related wounds*)

Introduction to the Data

Emma (Fictitious Patient)

Discharge	Demographics	Admissions characteristics	Admitting Diagnosis	Primary Diagnosis	Secondary Diagnoses (up to 17)
Emma	22, White, Hispanic, Medicaid	March 7, 1 PM, HUP, AMA	Altered mental state	Heroin overdose	Homelessness, abscess on right arm, cocaine use, HIV, depression, broken finger
Emma	22, White, Hispanic, Medicaid	May 21, 3 AM, Presby, AMA	Suicidal ideation	Major depressive disorder	Heroin overdose, pregnancy, alcohol, cannabis use, non-depression psychopathology
Emma	23, White, Hispanic, Medicaid	November 5, 5 AM, HUP, AMA	Abscess on right arm	Sepsis	Diabetes, anoxic brain injury, cocaine use

Introduction to the Data

Fictitious Patients

Person	Demographics	Admissions characteristics	Admitting Diagnosis	Primary Diagnosis	Secondary Diagnosis	Admissions characteristics	Admitting Diagnosis	Primary Diagnosis	Secondary Diagnoses (up to 17)
Emma	22, White, Hispanic, Medicaid	March 7, 1 PM, HUP, AMA	Altered mental state	Heroin overdose	Homelessness, abscess on right arm, cocaine use, HIV, depression, broken finger	May 21, 3 AM, Presby, AMA	Suicidal ideation	Major depressive disorder	Heroin overdose, pregnancy, alcohol, cannabis use, non-depression psychopathology
Josie	18, White, Non-Hispanic, Medicare	April 3, 10 AM, HUP, SNF	Shortness of breath	Sickle cell crisis	Opioid allergy, OUD, adverse reaction to opioids				
Evan	28, White, Medicaid	December 2, 8 PM, HUP, Routine	Depression	Opioid use disorder	Homelessness, HepC, Alcohol abuse, non-depression psychopathology, injury	December 27, 9 PM, HUP, AMA	Depression	OUD	Chronic pain, alcohol, homelessness, non-depression psychopathology, broken toe

Results (preliminary)

■ Demographics

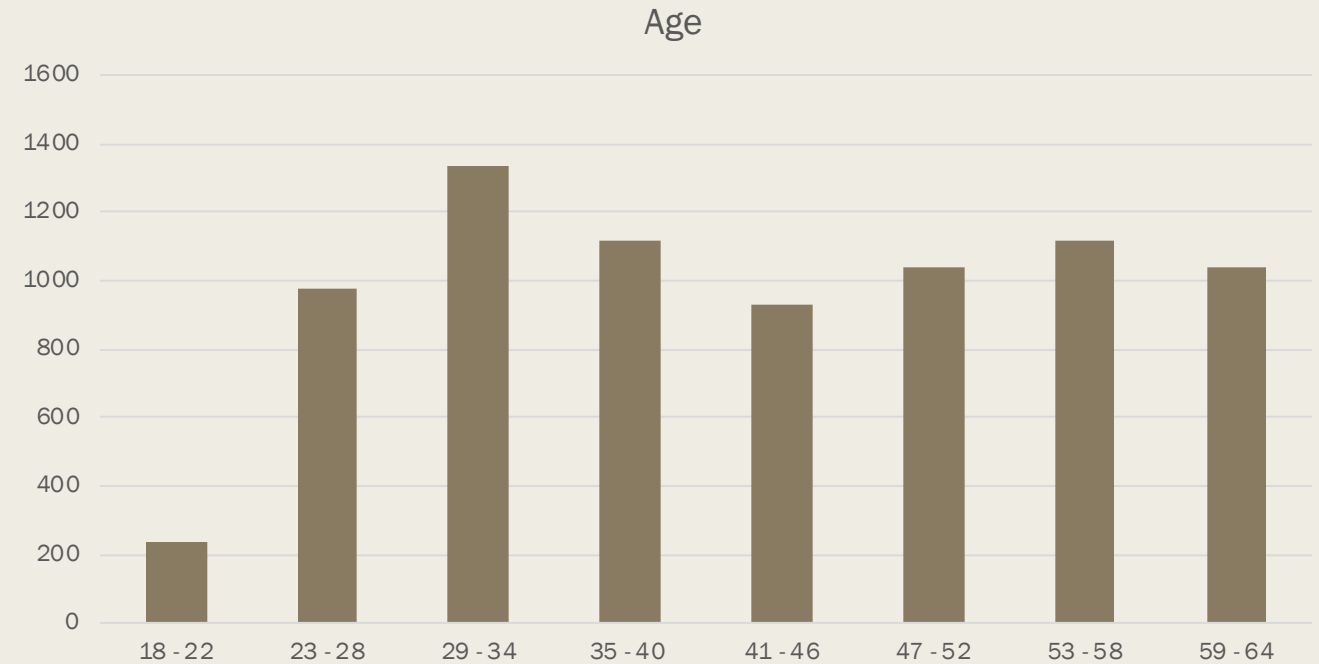
– Age (*mean*=42.6)

– Race

■ 56% White

■ 31% African American

■ 14% Other



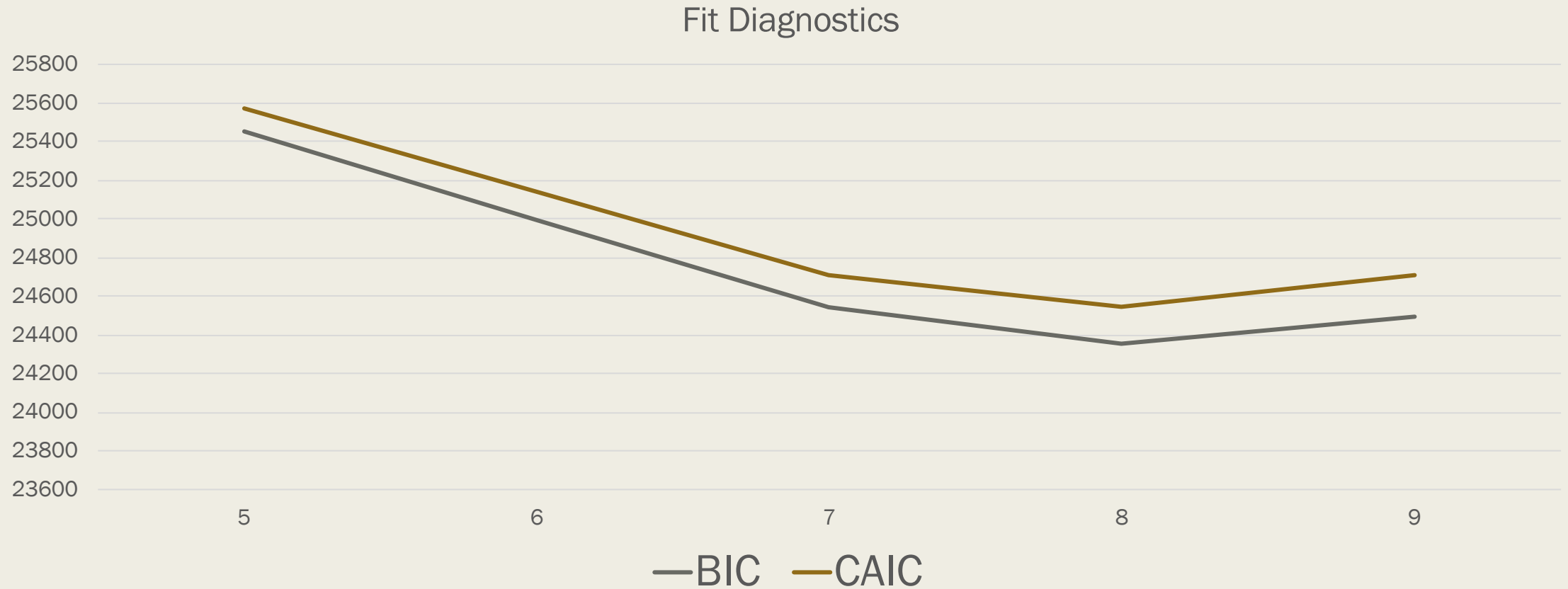
Results (preliminary)

Five Most Common Diagnoses by Type

Admitting	Primary	Secondary
Superficial Infection	Chronic Disease	Nicotine Dependence
Chronic Disease	Systemic Infection	Depression
Depression	Superficial Infection	Chronic Disease
Systemic Infection	Depression/Suicide	Polysubstance Use
Non-depression SMI	Pregnancy	Infectious Disease (HIV, HCV, Hep B)

Results (preliminary)

- Best fitting LCA suggested an 8 class solution



- Entropy: 0.73

Results (preliminary): Prevalence by Class

	1	2	3	4	5	6	7	8	Total Population
N	762	523	424	849	1954	868	192	2214	7786
%	9.8%	6.7%	5.4%	10.9%	25.1%	11.1%	2.5%	28.4%	
Age < 30	30.6	0.0	37.7	15.8	0.0	1.8	57.3	45.6	21.4%
Age > 50	1.2	65.8	0.0	19.0	82.2	46.4	4.2	0.0	32.5%
Non-cancer chronic	32.9	84.3	69.3	15.6	77.2	19.1	89.1	8.0	40.3%
Cancer	0.9	8.2	1.2	0.1	6.4	37.9	0.0	0.1	6.6%
Sickle cell	0.0	1.0	0.0	0.4	0.7	0.5	90.6	0.9	2.8%
Overdose	16.3	33.3	52.4	12.5	21.4	30.9	54.2	14.3	22.3%
Anoxia / hypoxia	10.5	36.0	72.4	5.2	16.4	2.1	2.6	2.2	13.0%
Injury	17.9	14.9	8.0	10.6	7.5	9.2	0.5	9.0	9.8%
Superficial	55.3	21.4	1.4	2.4	9.5	7.7	1.6	15.0	14.7%
Systemic	42.0	26.8	12.8	0.1	11.9	7.7	5.2	3.8	13.2%
Pervasive	24.2	9.8	12.7	0.5	3.8	1.4	1.6	1.2	5.2%
HIV/HEPC/HEPB	70.3	45.7	14.6	19.3	26.8	2.2	0.5	14.0	23.8%
Depression	62.2	72.7	21.9	78.9	36.1	39.2	33.3	32.8	44.3%
Non-depression SMI	14.2	27.0	10.4	32.3	11.4	5.5	3.7	4.2	12.0%
Cocaine	66.5	22.0	34.4	55.8	12.7	0.0	0.0	21.6	25.3%
Alcohol	12.7	22.8	8.3	49.7	12.6	0.5	0.0	4.0	13.0%
Pregnancy	4.5	0.0	0.0	0.2	0.0	0.0	3.7	13.8	4.5%
Homelessness	28.0	10.5	0.9	23.3	1.5	0.0	0.5	3.1	7.3%
Chronic pain	18.9	55.3	2.4	18.0	28.4	81.6	29.2	5.8	26.3%
2+ Discharges	74.5	100.0	4.3	9.8	0.3	8.4	48.4	4.8	18.9%
1+ AMA	47.0	21.6	4.5	8.5	6.8	2.3	5.2	23.5	16.0%
Average cost	\$198,630	\$228,539	\$190,404	\$44,637	\$91,817	\$90,446	\$121,367	\$49,277	\$100,158

Discussion

- This work is labor intensive but we think valuable
- There is discrete clustering in diagnoses and it is consistent with previous literature and theory
- Most people with OUD are not injecting in public settings; that is a concentrated problem among those with the most medical complexity

Limitations

- Our data is not as comprehensive or as broad as chart data
 - *Conditions not related to acute care surely under-measured*
 - *Some indicators are new (e.g., homelessness)*
 - *Missing data related to outpatient care*
- There is no perfect strategy for categorizing diagnoses

Next steps

- Continued refinement of the coding schema with clinicians
- Conduct final latent class analysis
- Submit at least two papers
 - *Paper typologizing patient presentations*
 - *Paper exploring prevalence and sources of co-occurring pain**
- Planned presentation at Harm Reduction Conference in Puerto Rico in Fall 2020

My Contributions

1. Assist with data management
2. Assist with the preliminary LCA
3. Analyze co-occurring pain diagnoses
4. Draft brief report on co-occurring pain

Lessons Learned



Collaboration is key!



Know your data, know
your data, know your data



This is fun!

Thanks!

Questions?

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Bullpen

1. Age<30
2. Age>50
3. Non-cancer chronic
4. Cancer
5. HIV/HepB/HepC
6. Superficial Infection
7. Systemic Infection
8. Pervasive Infection
9. Pain
10. Injury
11. Pregnancy
12. Depression
13. Non-depression SMI
14. Anoxic Brain Injury
15. Cocaine
16. Marijuana
17. Alcohol
18. Multiple Discharges
19. Any AMA
20. Medicare Disability
21. Charge>Median
22. Homelessness
23. Sickle Cell