

Motivation

- **62%** of adult Internet users in U.S. use social network websites for health-related topics [Pew'11]
- Misinformation on social media can have adverse effects on public health [Chou'18]
- Medical misinformation movements: vaccine hesitancy (anti-vaxxer), pro-anorexia, Ebola and Zika epidemics

Opioid Use Disorder (OUD) in the U.S.

- Opioids misuse and addiction (prescription pain relievers, heroin, and synthetic opioids) constitute a **serious national crisis**
- CDC estimates the total economic burden to be **\$78.5 billion** a year [Florence'16]
- Since 1999, opioid overdoses have **quadrupled** with **33,091** deaths in 2015 [CDC'16]
- **At risk populations** are known to be vulnerable or misled by misinformation
- Exposure to misinformation can lead to people worrying that they will be ostracized by their community and **delay treatment**
- **Public health communicators** are struggling how to intervene when a health topic becomes riddled with falsehoods inconsistent with evidence-based medicine

Research Question

First effort to track and monitor social media for opioid misinformation

What are the characteristics and prevalence of online misinformation related to opioid use disorder (OUD)?

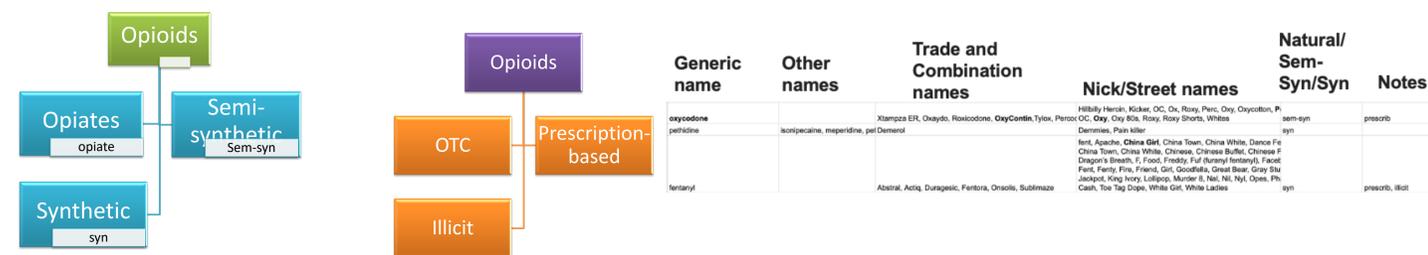
Challenge: Rich Discourse

Categorization of Online Discourse for Opioids

- Use, Perception, News
- Use: Own use (medical, recreation, other), use by others (people they know, drug use in public places)
- Use: Abuse (co-use (opioids, illicit drugs, alcohol), standalone), legitimate use
- Perception: Commentary on opioids in general/opioid crisis

*Okay I am planning to discontinue **treatment**. I feel I need support, but with my family disapproving of this **treatment** of being on **MMT**, I don't seem to be **getting** that. To them, it is no different from doing heroin everyday. They say I am **switchin** gone addiction for **another** [...]*

Developing an Opioid Lexicon



Dataset Collection



Twitter

- Opioid lexicon
- 7.5M tweets



- Reduced set of keywords (treatment)
- 99.4K comments

Drug forums

1457 posts

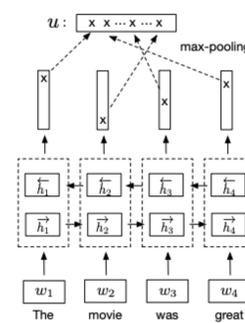


- 69 → 22 subreddits
- 1.4M posts
- 14M comments



ML for Misinformation Detection

Agonist therapy or medication assisted treatment (MAT) for OUD is merely replacing one drug with another. Example quote: "You are not really in recovery if you are on Suboxone." [Heimer'18]



InferSent: Universal sentence representations [Conneau'17]

Semantic Similarity to get KNN

Annotations by CDC experts

Model	AUC	Precision	Recall	F1
LR + Semantic	0.85	0.87	0.86	0.86
LR + TF-IDF	0.91	0.85	0.91	0.88

Prevalence between 0.004 (Reddit)-0.009 (Twitter)

Platform	Nearest Neighbors
Drug forums	assist (0.49), proven (0.46), lifer (0.46), abstin (0.42), recoveri (0.41), stigma (0.41), mmt (0.41), superior (0.4), vivitrol (0.39), align (0.39), treatment (0.39), lifesav (0.39), mainten (0.39), adhes (0.39), bamboo (0.38)
Twitter	treatment (0.61), medic (0.48), suboxon (0.46), bupe (0.43), need (0.4), therapi (0.39), behavior (0.39), stigmat (0.38), oud (0.38), postod (0.38), clear (0.37), suffici (0.37), med (0.36), part (0.36)
YouTube	assist (0.72), recommend (0.72), care (0.7), bullshit (0.68), recoveri (0.67), truli (0.66), mention (0.66), step (0.65), anyon (0.65), mani (0.64), could (0.64), oud (0.63), possibl (0.63), lose (0.62), integr (0.62)

Nearest Neighbors for "mat"

