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# Medical Cannabis Dosing Trajectories Among Patients with Prescriptions

Alexandra F. Kritikos, Ph.D.

Postdoctoral Research Associate, USC Schaeffer Center

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Dominic Hodgkin, Ph.D.; Myfanwy Graham, MS; Rosalie Pacula, Ph.D.

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No Conflicts of Interest

# Background

- Cannabis is legalized for medical purposes in 39 states in the U.S.
- The number of patients taking it continues to rise
- Medical cannabis used for various conditions/symptoms

# Medical Cannabis

- No clinical data recording actual dosing recommendations to patients exist in the U.S.
- Limited scientific data to direct healthcare providers and patients on dosing administration for specific conditions



# Medical Cannabis Research

## LIMITED FINDINGS!

**Clinicians** are faced with questions from patients about cannabis and its medical applications

**Patients** rely on information from various sources (internet, social media, butenders etc)

**Policy makers** are in a gray area

# Research Today...

## Measuring cannabis use has been a thorny issue

Attempted to assess use patterns among patients with different conditions

Incomplete picture:  
Single-time measures  
and patient  
recollections

Inquiring about products used, potency and modes of consumption

May compromise the validity of the study  
(under or overestimate use)

**The need for new analytics!**

# Dosing Information is Urgently Needed



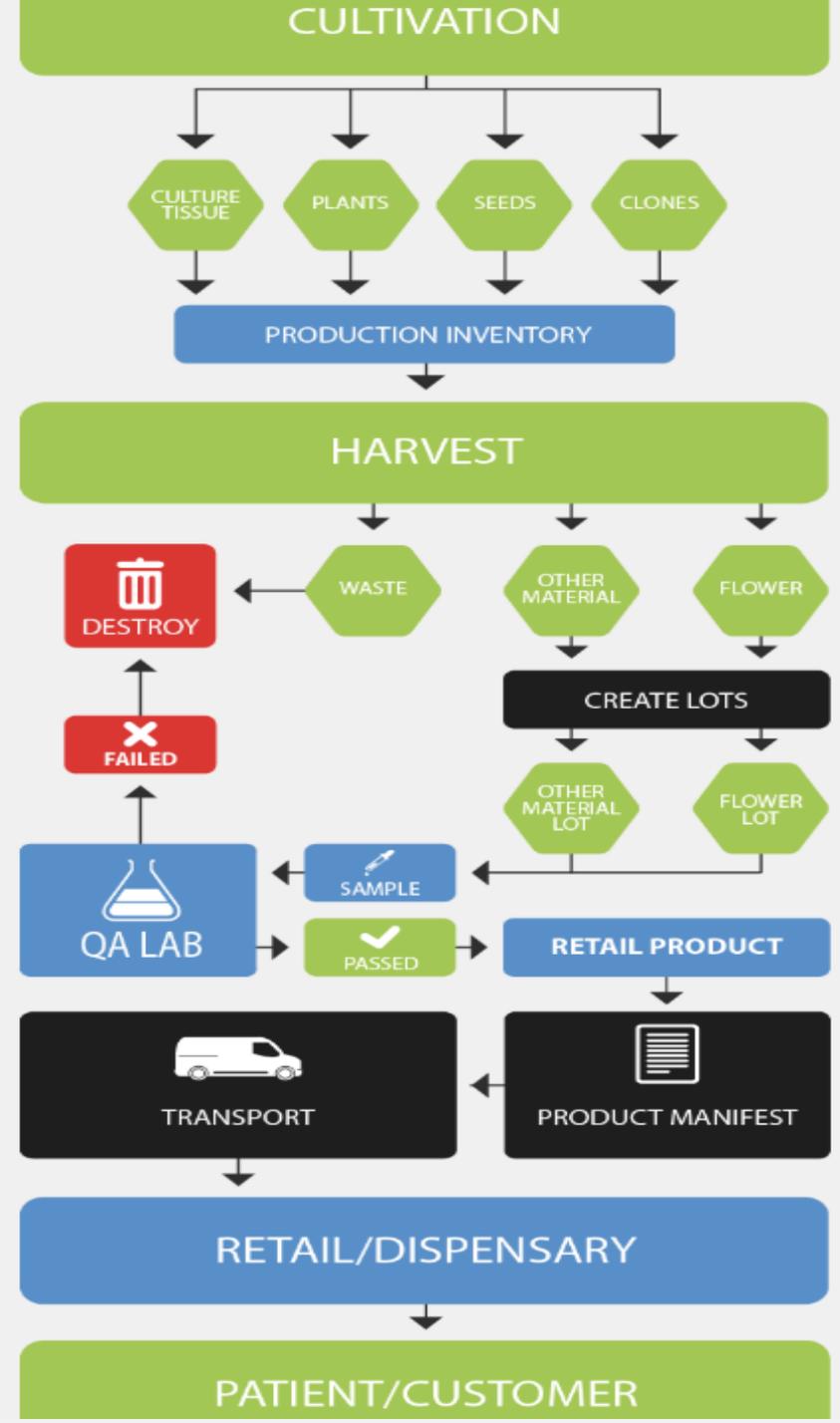
Information on Medical Cannabis Dosing in the U.S. is urgently needed



Real-World point-of-sale transaction data on purchases within a medical market to gain an understanding of THC and CBD dosing decisions by patients who are using cannabis medicinally

# Seed-to-Sale Cannabis Tracking

Seed-to-sale systems track every gram of legal cannabis throughout the production lifecycle.



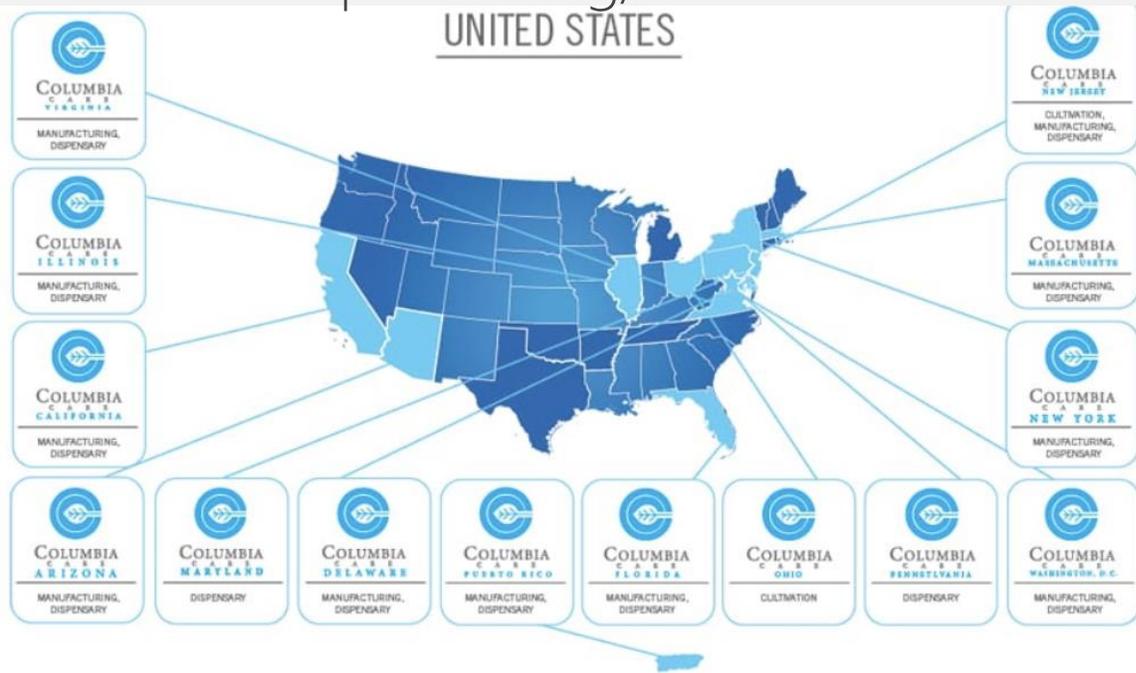
Point-of-Sale (POS): In addition to linking products to plant origin, each sale is tracked to the patient or

# Point-of-Sale Data: Cannabis Supplier in NY State

- Founded in 2013. One of the largest providers of medical cannabis in the U.S.
- Cultivation and Manufacturing. **Pharmaceutical-Quality Formats & Formulations**

## Focusing on New York State

- Includes the patients' medical conditions and symptoms
- Smokable cannabis (flower) was not permitted during study period
- Cap at 10 mg/ dose



# Point-of-Sale Data

## Product Details

- Type of Product
- THC, CBD mgs (unit and total in product)

## Individual Details

- Patient ID
- Invoice # (e.g. transaction)
- Date of Purchase
- Date of birth
- Gender
- Qualifying Condition  
Associated Symptoms

# Methods

## Medical Cannabis Use Trajectories

### Data

- Retrospective cohort study
- Secondary analysis: 2016-19
- 5 dispensaries
- 16,727 patients
- 174,244 purchases

### Measures

#### Independent Variables:

- Demographics
- Conditions /symptoms

#### Dependent Variables:

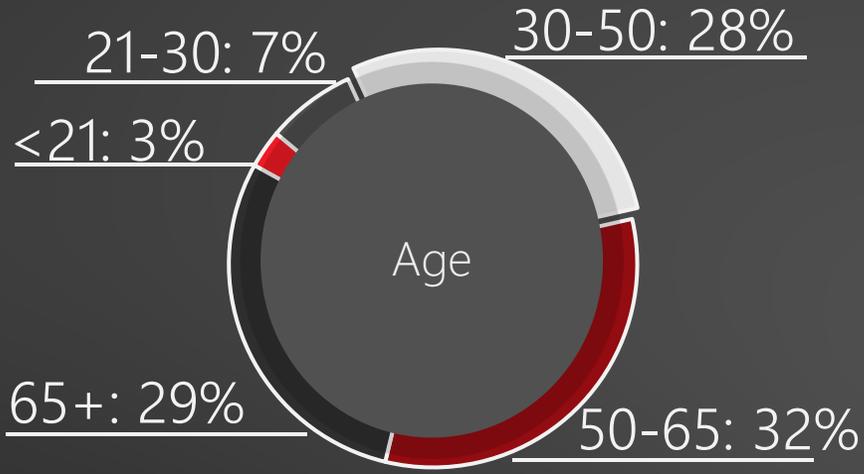
- Average daily dose of THC (mg)
- Average daily dose of CBD (mg)

### GBTM

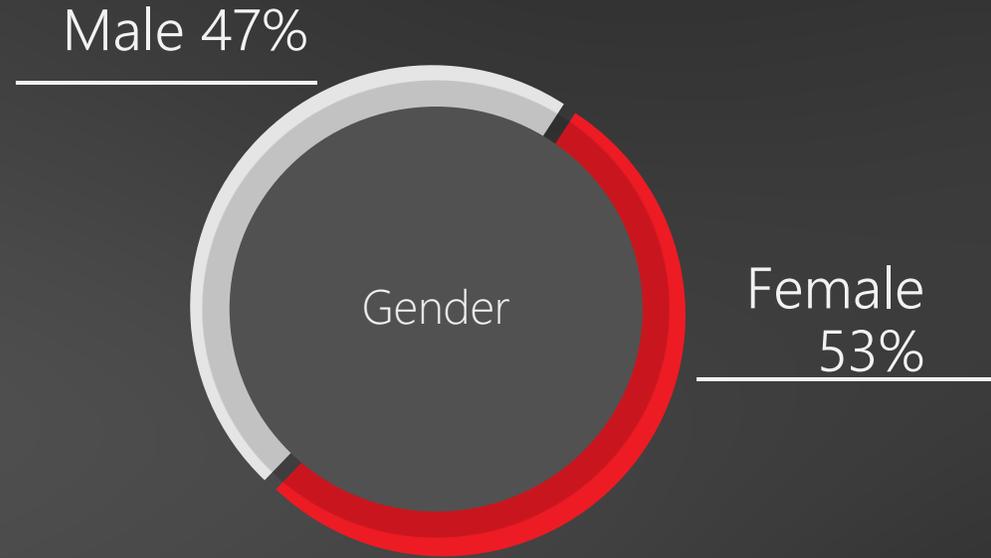
- Identify clusters of patients exhibiting similar trajectories in dosing each month over the study period

#### Output

- The estimated  $P(x)$  of group membership for each patient and each group
- An estimate trajectory curve over time for each group



Age Groups



Gender

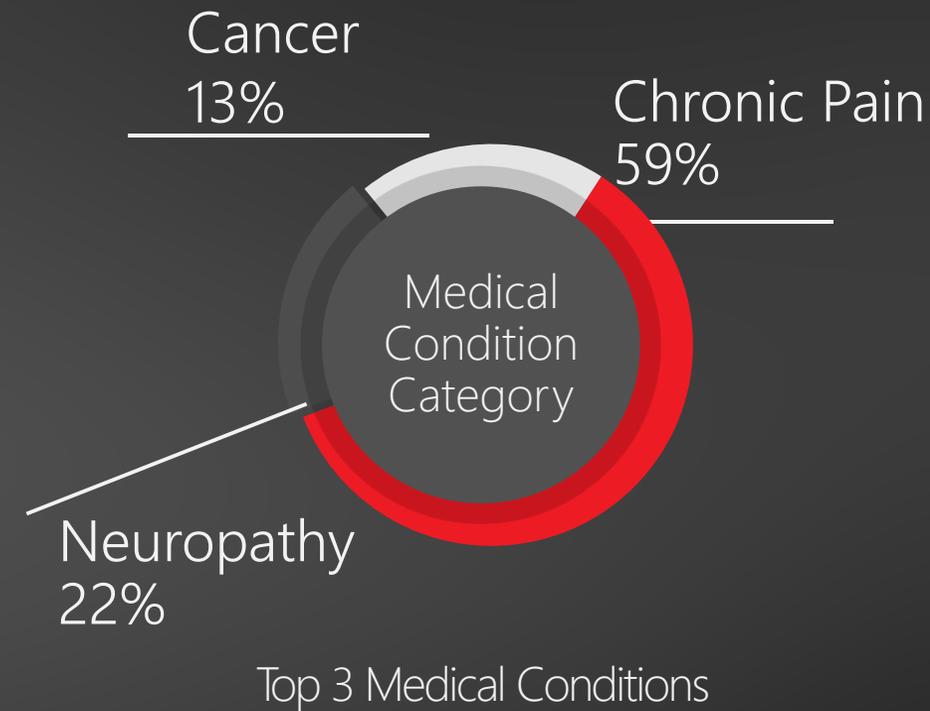
# Baseline Characteristics Of Purchasers

## Overview

The majority of users are:

- Over the age of 50
- Sample split between gender

Condition	Total Sample
Cancer	13.13 (2,196)
Chronic Pain	51.93 (8,687)
Epilepsy	2.70 (452)
HIV/AIDS	1.16 (194)
IBD	4.91 (821)
MS	3.62 (605)
Neuropathy	22.05 (3,688)
Opioid Reduction	0.87 (145)
Parkinson's	2.16 (362)
PTSD	4.50 (752)
Spinal Cord Injury	4.11(688)



# Frequency of Patient Conditions

The top 3 qualifying medical conditions of patients:

- 1) Chronic pain
- 2) Neuropathy
- 3) Cancer

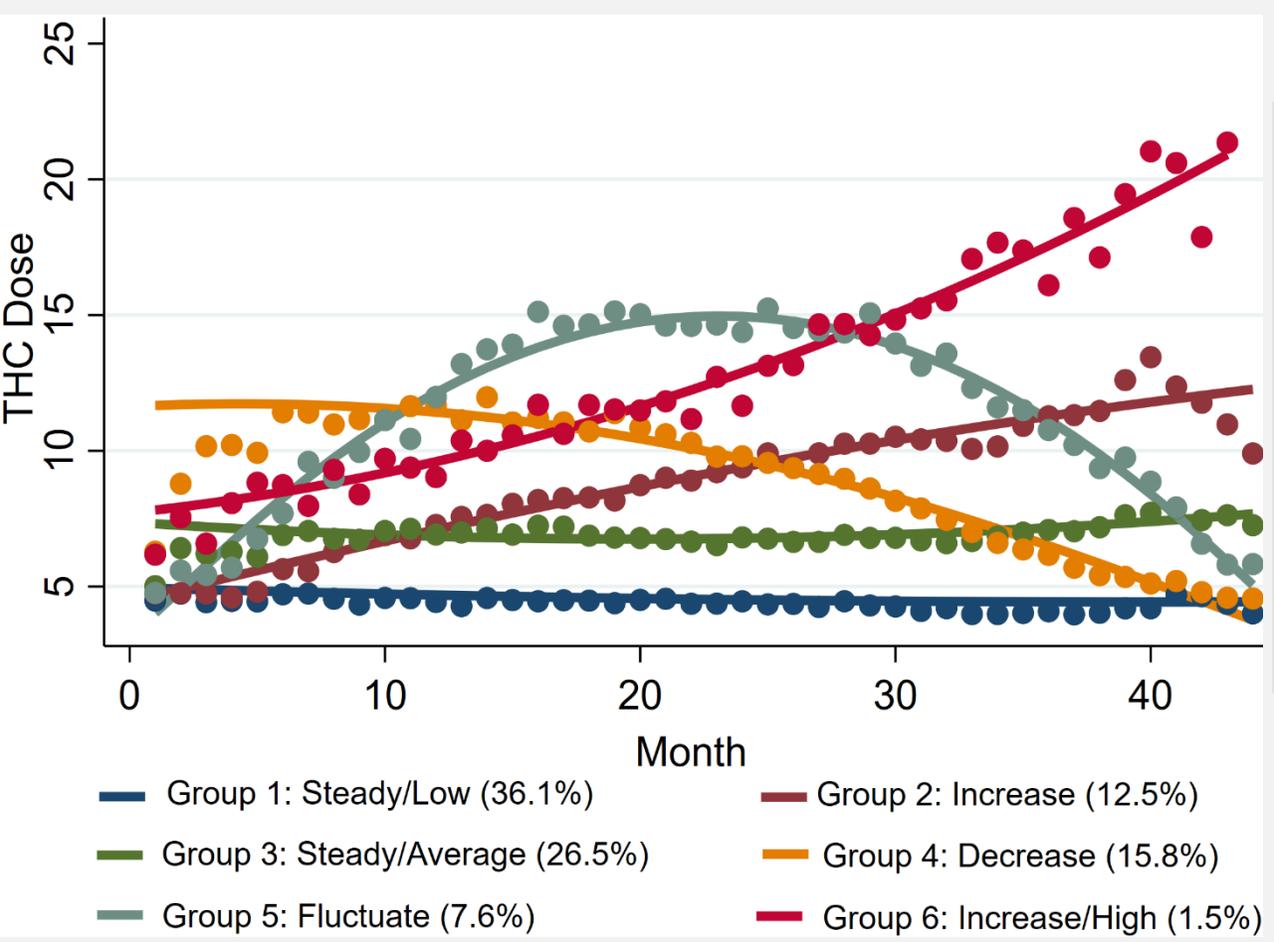
	Average THC dose (mg)	Average CBD dose (mg)
Total	7	8.2
Male	7.2	8.3
Female	6.8	8.1
Age		
<21	6.3	7.9
21-30	7.2	8.9
31-50	7.5	9.0
51-65	7.1	8.2
65+	6.5	7.3

	Average THC dose (mg)	Average CBD Dose (mg)
Cancer	6.3	7.4
HIV/AIDS	6.3	7.7
Parkinson's	6.6	7.1
Multiple Sclerosis	7.0	7.8
SpinalCord Injury	7.0	7.8
Epilepsy	6.0	7.1
IBD	7.2	8.1
Neuropathy	7.0	7.9
PTSD	7.1	9.1
Chronic Pain	7.3	8.6
Opioid Reduction	7.5	8.9

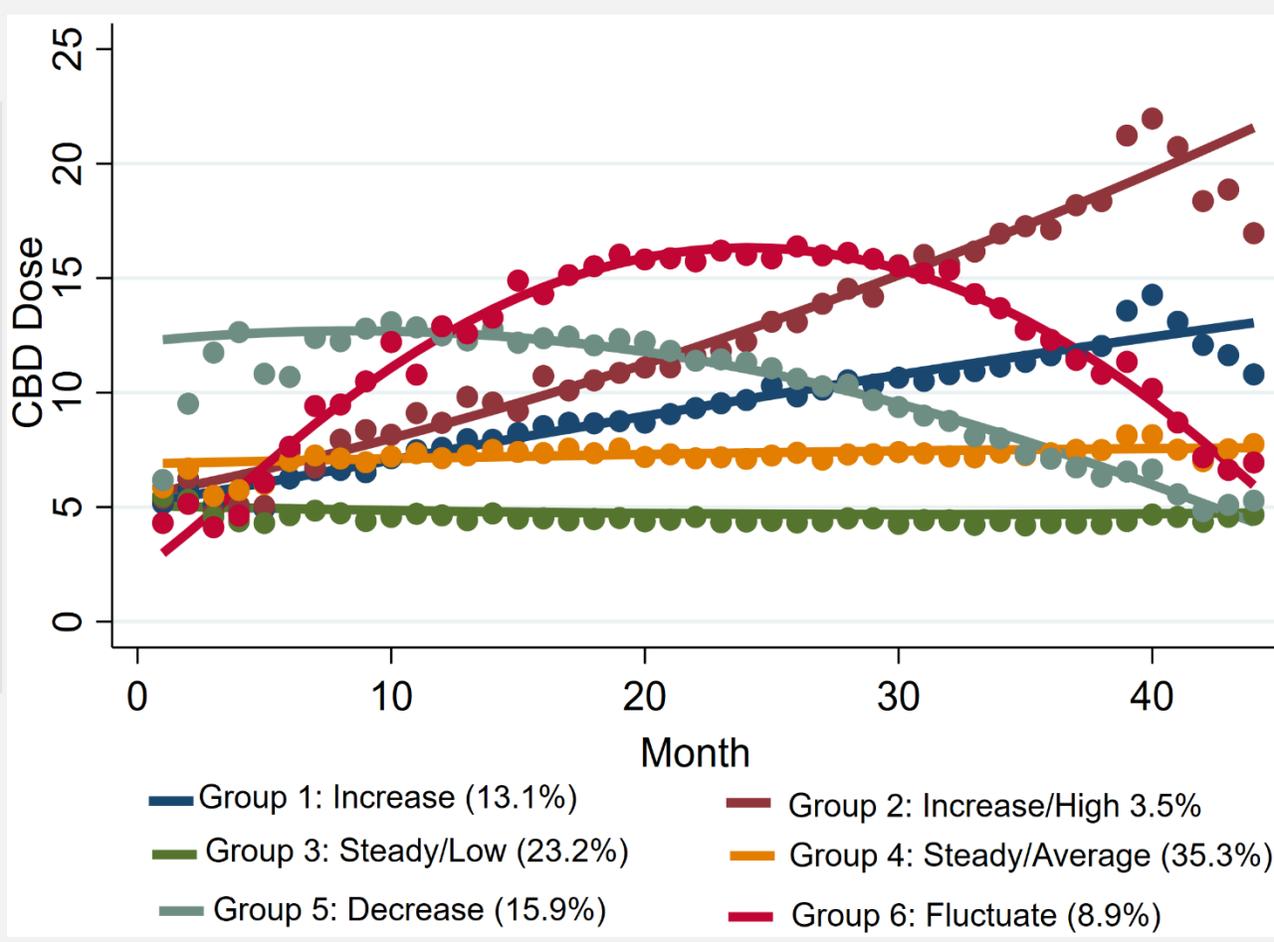
## Mean Daily THC & CBD doses, by Patient Characteristics

- The typical average daily dose of THC is 7 mg, and of CBD is 8.2 mg.
- Patients with the top three medical conditions, cancer, chronic pain, and neuropathy purchased an average THC dose of 6.3, 7.3, and 7.0 mg respectively and an average CBD dose of 7.4, 8.6, and 7.9 mg of CBD.

Group categories classified based on the trends of THC potency across time.



Group categories classified based on the trends of CBD potency across time.



# Trajectory Results and Patient Grouping

- Most individuals use steady-low amounts of CBD and average-low amounts of THC
- Individuals with a qualifying condition related to pain such as cancer, neuropathy, and chronic pain are more likely to fall into these steady THC and CBD trajectory groups where dosing does not increase or decrease across time.
- Patients with epilepsy were overrepresented in trajectory groups with higher doses of CBD
- Almost 66% of individuals with PTSD purchased a steady/average dose of THC and products with low CBD.
- The majority of patients using medical cannabis for opioid reduction were in the increasing THC group.

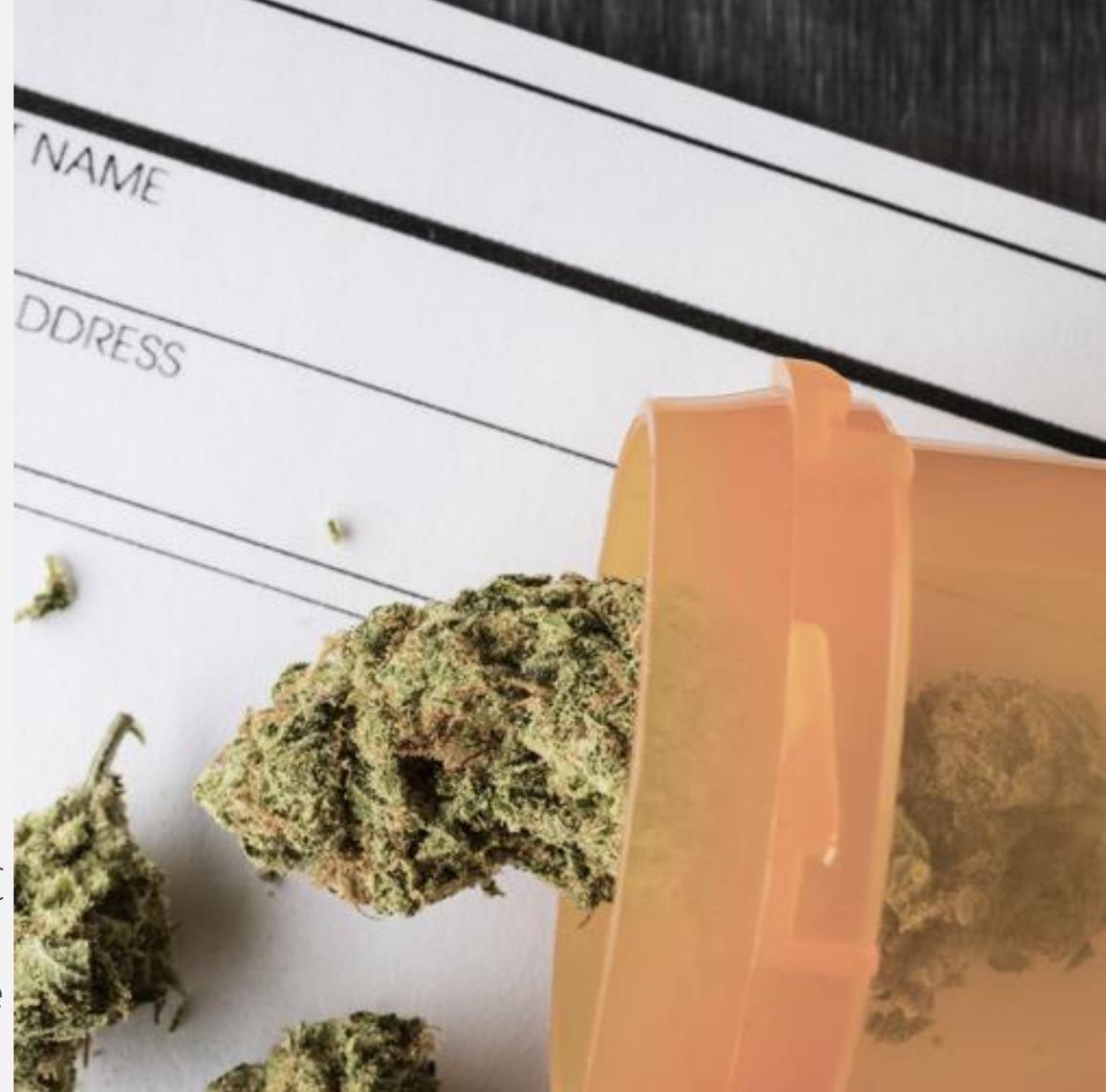
# Discussion

The typical daily dose of THC in this sample is 7 mg and of CBD is 8.2 mg but our results show that patients may follow different trajectories with varying daily doses of THC/ CBD depending on their qualifying reason for purchasing medical cannabis.

Trajectories groups may represent different patient behaviors. Patients in a:

- increasing THC group may be developing tolerance to the therapeutic effects of higher THC
- fluctuating/decreasing groups may not be finding MC to be effective or may experience adverse effects.
- steady group may perceive their doses to be effective

Characterizing the distinct trajectories is of public health importance. Particularly identifying conditions where increasing trajectories of THC may occur.



These data could also allow clinicians to make more informed decisions about the use of medical cannabis

# Conclusion and Contribution



As we wait for clinical evidence to emerge, longitudinal methods and medical cannabis use trajectories that reflect actual purchases made by patients with specific registered conditions can help inform providers, policy makers, and researchers about what doses patients use.



Strengths	✓	Point-of-Sale Data	Longitudinal Methods	Patient Conditions	Dosing
Limitations	✗	Purchases not actual doses consumed	Data from NY-closed model	Current Health Information	Race/Ethnicity not in POS data

# Strengths and Limitations

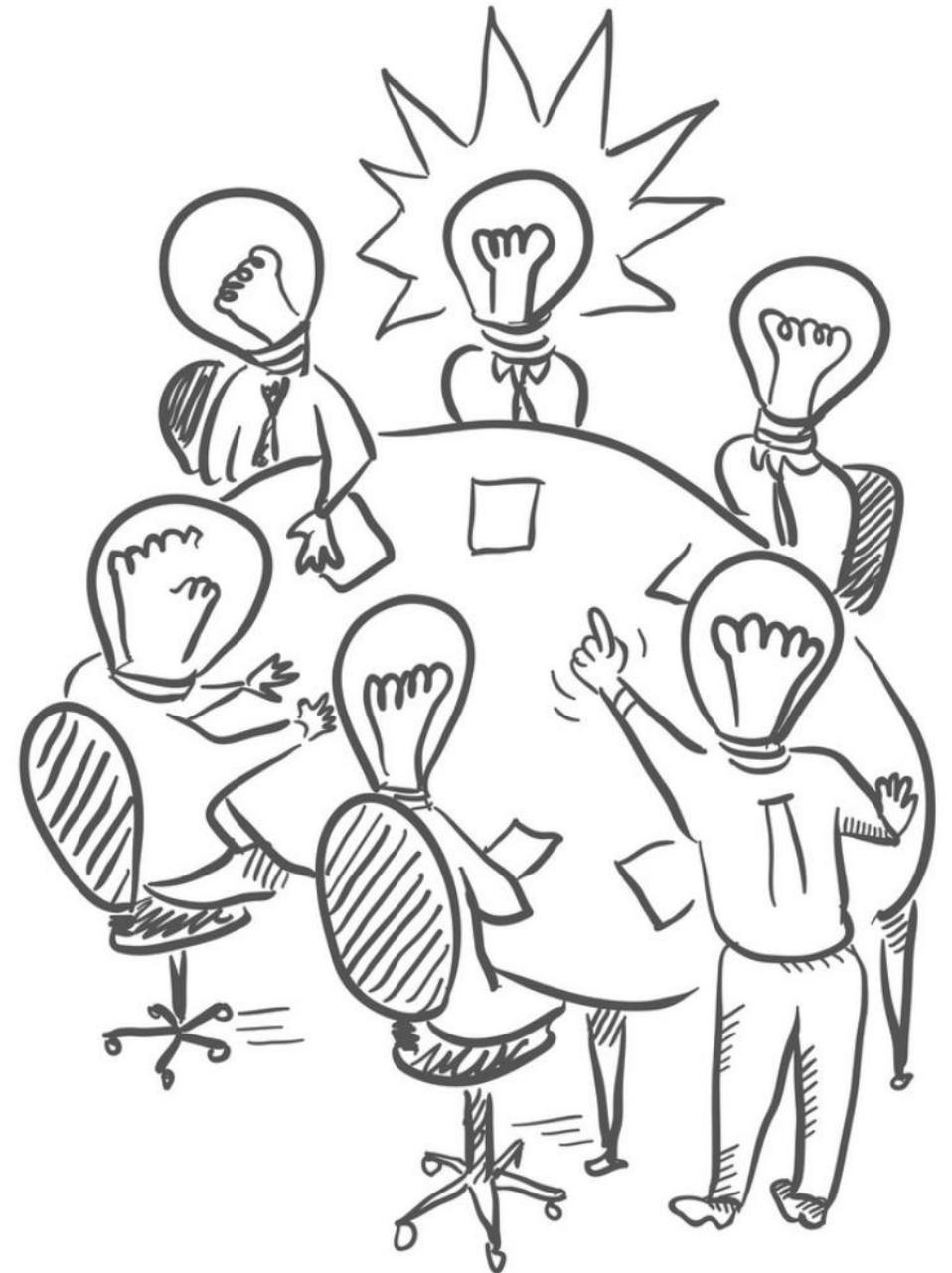
One of the first studies to use 'point-of-sale' data in order to assess medical dosing, across time.

# Policy Implications

Filling in the gaps

What we should be thinking about

- Potency levels and harms
- Measuring quality (THC/CBD)
- Measuring Quantity
- Dose – response relationships
- Prescribing Guidelines



# Thank you!

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Alexandra F. Kritikos, Ph.D.

 [kritikos@usc.edu](mailto:kritikos@usc.edu)

 @AFKritikos