

# Assessing High Risk Periods for Overdose Deaths

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SCHOOL OF MEDICINE  
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**



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# Disclosures

- The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:
  - None to disclose

# Goals

1. Career development trajectory
2. Content on criminal justice involvement and overdose
3. Applicable methods

# **1990s: Needle Exchange Washington DC and San Francisco**

[needle exchange pictures]

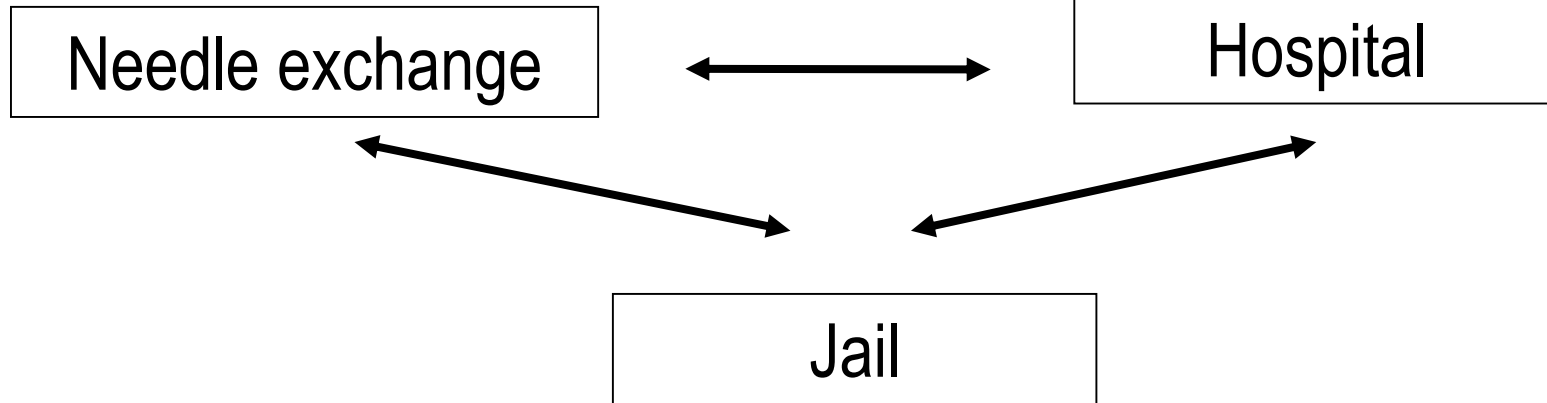
# Education

Swarthmore College  
Biology, Women's Studies

UC Berkeley / UCSF  
MS and MD

University of Washington, RWJ  
Clinical Scholars Program, MPH

- Abscess
- Cellulitis
- HIV
- Endocarditis
- Overdose



# Why should we care about the criminal justice system?

# Why care about the criminal justice system?

- Large population: 7 million people involved at one time
- Greater flow: 13 million people through jails in 1 year
- High disparities: 1/3 of African American men with prison time
- Criminal justice involvement common in people with substance use disorders
- Neglected area of medicine
- Interesting research challenges



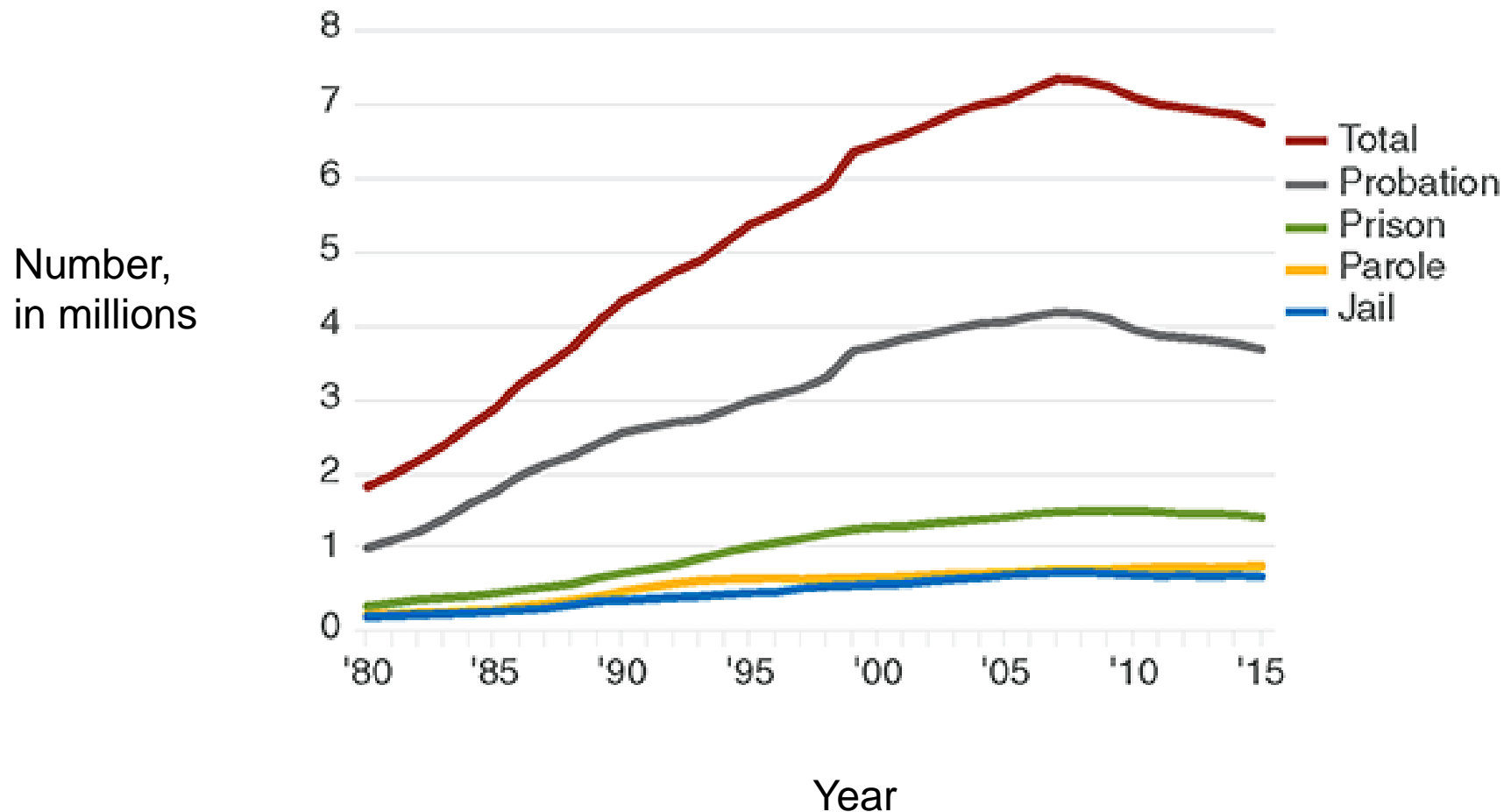
# Jail and prison inmates excluded from many national health surveys

- Behavioral Risk Factor Surveillance System (BRFSS)
- National Health Interview Survey (NHIS)
- National Health and Nutritional Evaluation Survey (NHANES)
  
- But, Bureau of Justice Statistics (BJS) does collect some data on health and correctional populations

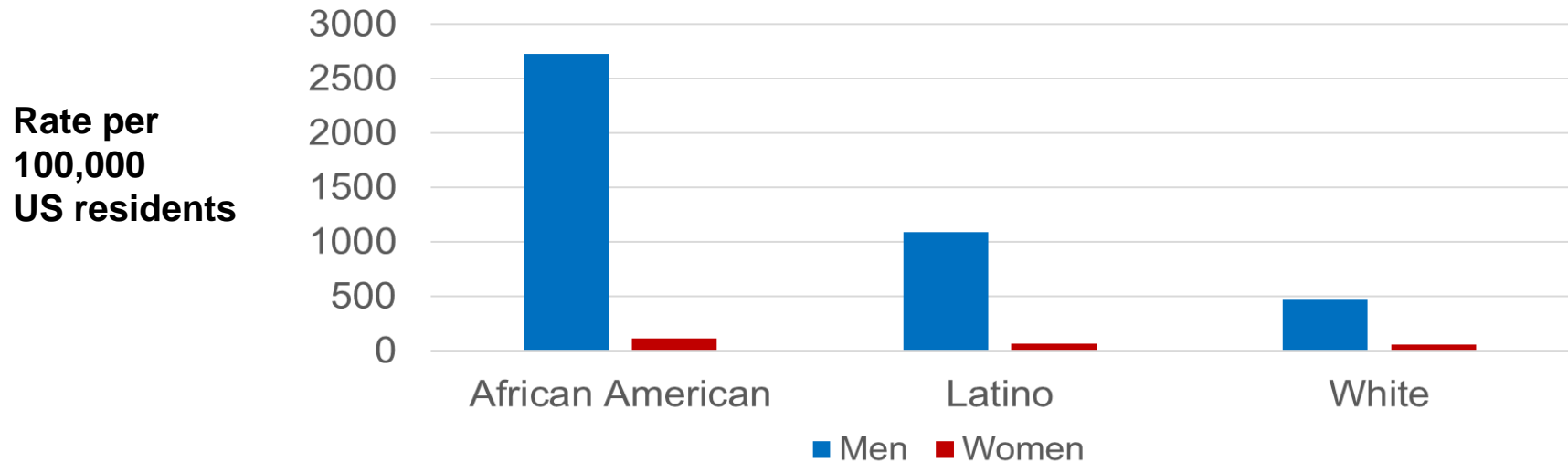
# The scope of the U.S. criminal justice system

Term	Description	Number, year-end 2015
Probation	Serving a sentence in the community	3,789,800
Prison	State and Federal, convicted, serving >1 year sentence	1,526,800
Parole	Return to the community after serving a sentence with stipulations	870,500
Jail	County & city, detention after arrest or serving a sentence of <1 year	728,200
<b>Total</b>		<b>6,741,400</b>

# U.S. adult correctional population growth, 1980-2015



# U.S. imprisonment rate by race/ethnicity & gender



# Clinical Experiences

[pictures]

McNeil Island Correctional Facility

Madison Clinic at Harborview  
Medical Center, Seattle

# Clinical experiences



# Challenges during prison re-entry

- Employment
- Housing
- Re-integration with families & communities
- Legal identification
- Parole conditions
- Drugs & alcohol
- Health care

La Vigne, Castro, Vicher, 2004,  
Burgess-Allen, 2006, Freudentberg, 2005

# Health outcomes of individuals released from prison

*How would you study this?*

- *What data sources could you use?*
- *What study designs would you consider?*



# Study designs employed to examine transition from prison to the community

1. Retrospective cohort
2. Nested case control
3. Qualitative interviews
4. Prospective cohort
5. Randomized controlled trial

# Washington prison cohort study

- Design: Retrospective cohort study
- All releases from Washington State Dept. of Corrections from July 1999 to December 2009
- 76,208 followed for 334,238 person-years and 192,511 releases

Binswanger, Blatchford, Mueller, Stern. Ann Intl Med 2013; 159(9): 592-600.  
Binswanger, Stern, Deyo, Heagerty, Cheadle, Elmore, Koepsell, NEJM. 356 (2): 157-65.

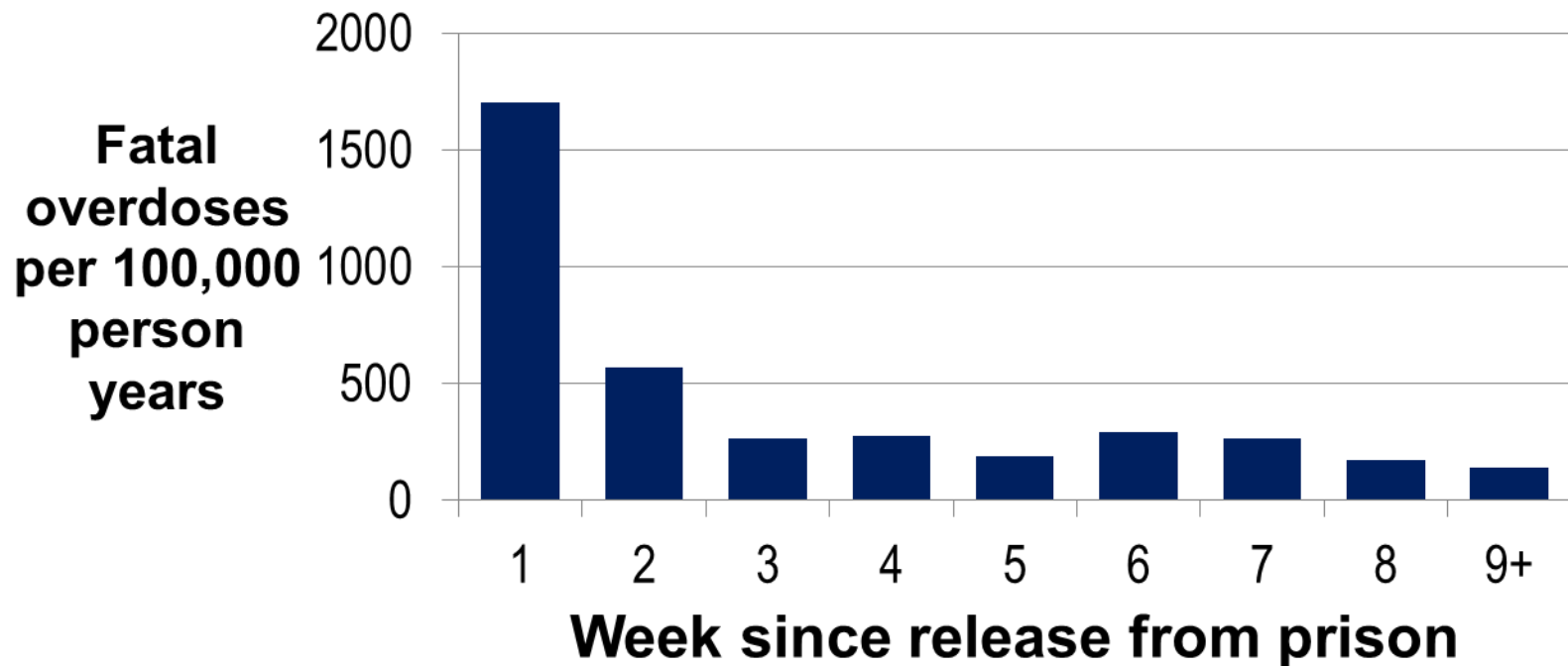
# Potential sources of mortality data

- Individual:
  - National Death Index
  - State vital statistics registries
  - Social security master file
  - Within system registries (e.g., health care system, prison data)
  - Surveys (e.g., Deaths in Corrections Reporting System)
- Aggregate:
  - CDC Wonder

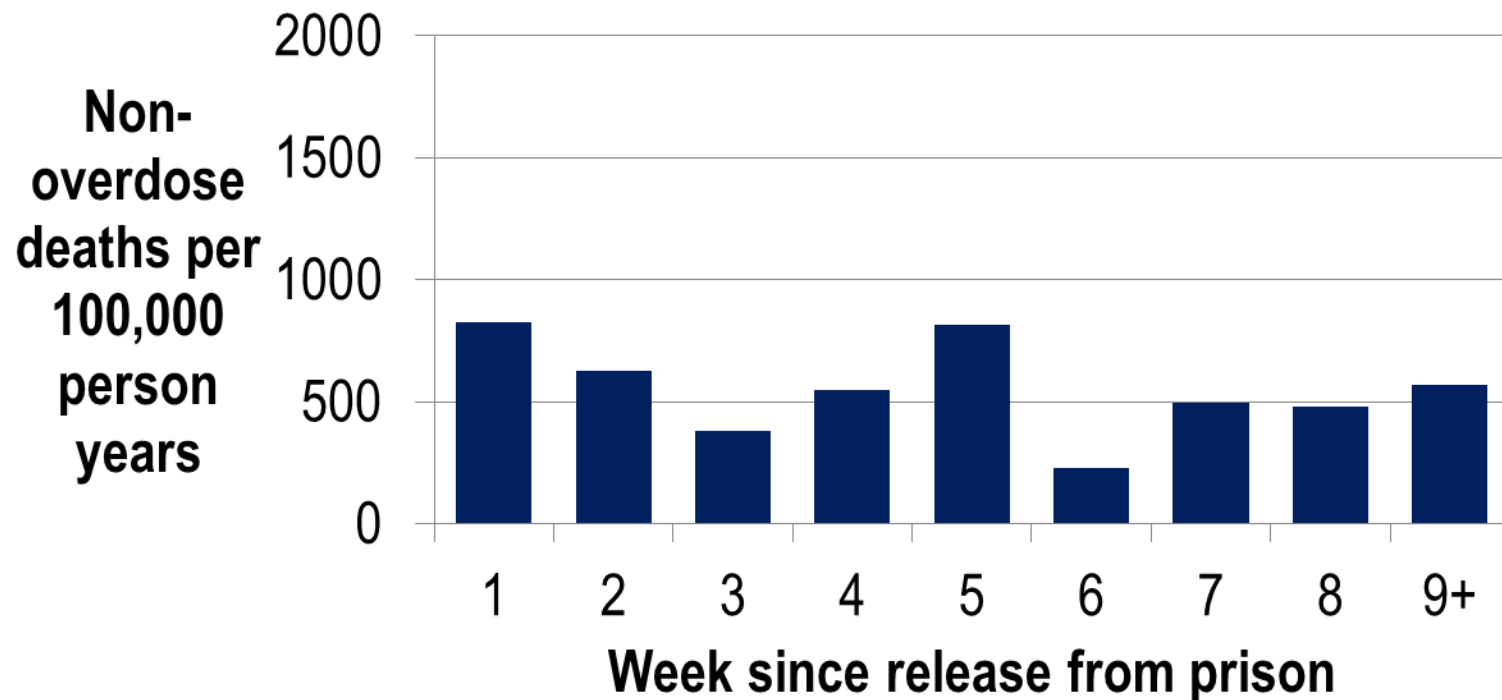
# Analysis: cohort study

- All available identifiers linked to the National Death Index to identify deaths and causes of death
- Deaths per 100,000 person-years calculated by cause of death and time since release
- Standardized mortality ratios (SMR) to compare death rates among former inmates with non-institutionalized population, adjusted for age, race and gender
- Cox proportional-hazards regression to estimate the effect of demographics and criminal justice characteristics on hazard ratio for death

# Overdose mortality by week since release from prison, Washington State, 1999-2009 (N=76,208)

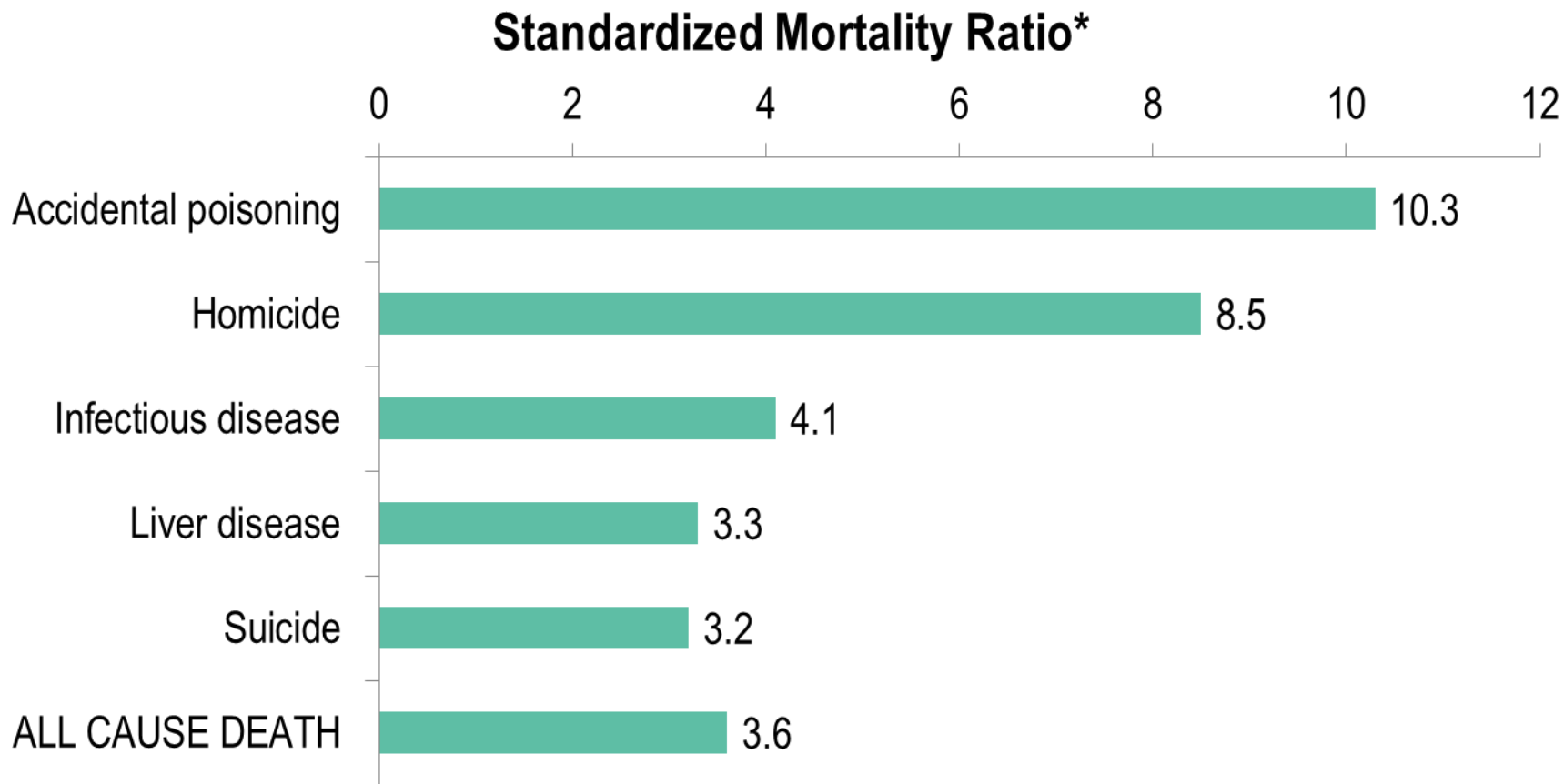


## ***Non-overdose deaths by week since release from prison, Washington State (N=76,208)***



Binswanger, et al., Annals Internal Medicine 2013

# Comparisons with the non-institutionalized population



\*Adjusted for age, gender and race, 2000-2009, all significant

## Leading causes of substance-related deaths after release, Washington State (N=76,208)

	Deaths (n=2,462)	Mortality rate per 100,000
Opioids	365	109
Pharmaceutical opioids	259	77
Heroin	123	37
Cocaine	209	55
Psychostimulants	136	41



# Opioids and prisons: important part of the opioid epidemic

- Opioids involved in 15% of all deaths among people released from prison
- Overdose deaths in cohort accounted for 8% of the overdose deaths in Washington state

# Risk factors for death after release from prison

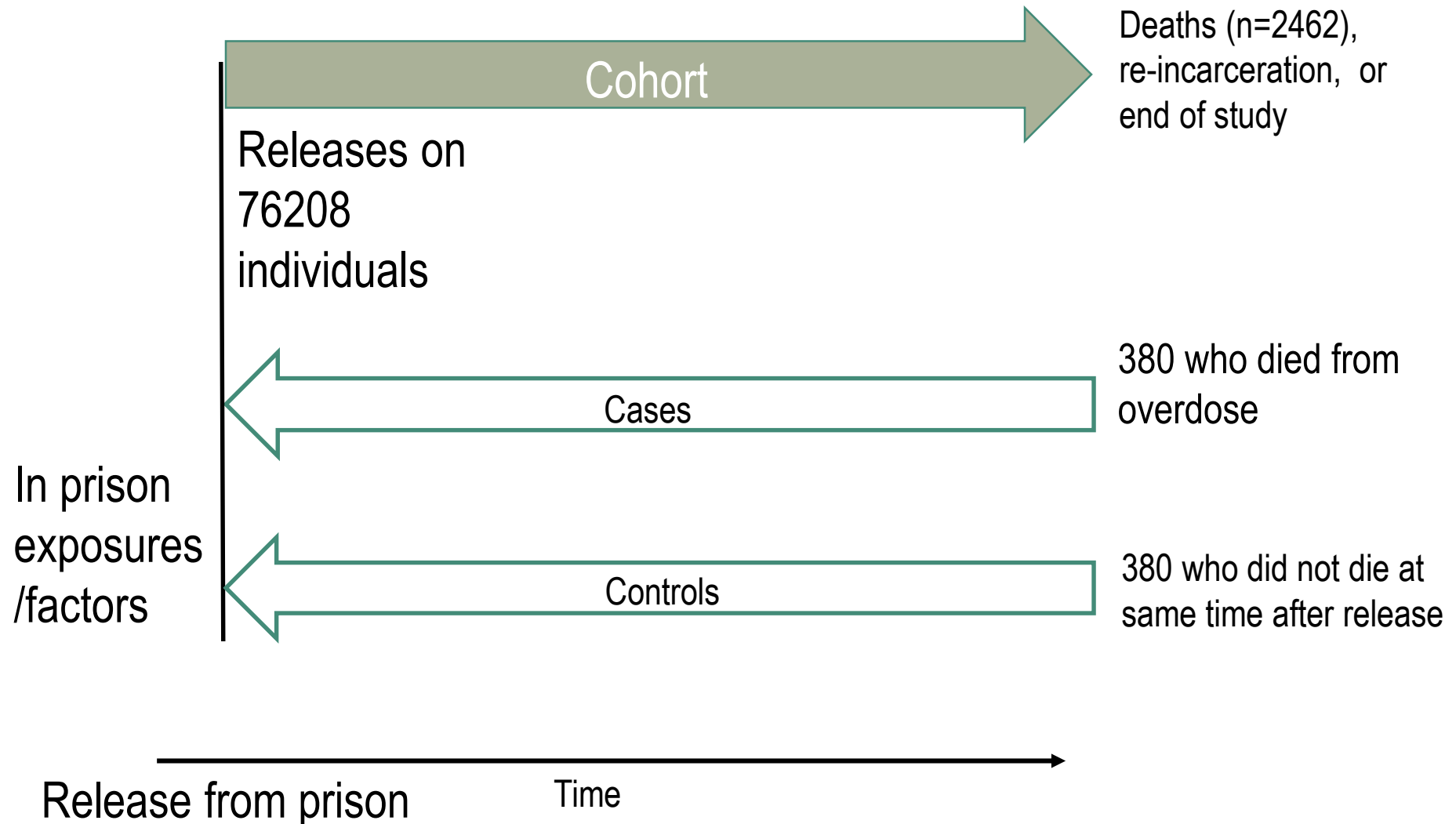
- Some data available electronically
  - Demographics
  - Criminal justice characteristics
- Clinical data more challenging to obtain

*How would you approach getting these data?*

# Challenge

- [picture of paper medical records]

# Nested Case Control Study with Risk Set Sampling, 1:1 matching



# RISK FACTORS FOR DEATH AFTER RELEASE FROM PRISON

## Medical Record Abstraction Database

STUDY ID: 1

Find Record by Study ID

Gender: M

Age at Release: 45

Index Admission Date: 9/27/1994

Index Release Date: 4/10/2002

### Criminal/Custody Characteristics

StudyID 1

Instructions: Please do not include data from after the index release date.

#### 1. Source of Criminal/Custody Characteristics Data (check all that apply):

- ☐ Legal face sheet    ☐ Chemical dependency record (blue folder)    ☐ Mental health records (paper)  
☐ DT86    ☐ Electronic data    ☐ Other, specify:

#### 2. No prior incarcerations: ☐

3a. Maximum release date (MXED) of sentence for index incarceration:

b. Coder notes:

4a. Inmate security classification or custody level at time of index incarceration release:

b. Coder notes:

#### 5a. Arrest related to attempted delivery of illegal drugs?

☐ Yes    ☐ No    ☐ Missing

b. Coder notes:

#### 6a. Release type:

☐ Community Supervision after release (CCI transfer), specify name/location of field office:    ☐ Expired sentence

Record: 1 of 868

Unique StudyID

# Nested case control study: selected risk factors for overdose mortality

Characteristic (N=380 case control pairs*)	Odds Ratio (95% CI)
Substance use disorder	2.33 (1.32, 4.11)
History of injection drug use	2.43 (1.53, 3.86)
Have children	0.56 (0.37, 0.85)
Receipt of treatment in prison	0.57 (0.36, 0.90)

\*Matched on age, gender, year since release; time since release

NIDA R21DA031041

Binswanger IA, Stern MF, Yamashita TE, Mueller SR, Baggett TP, Blatchford PJ.  
Addiction. 2016 Mar;111(3):499-510

*Why the high risk for overdose death during the post-release period?*

*How would you study this?*

# Prison re-entry and health: A qualitative study

29 individuals interviewed in first 2 months after release from prison:

- Health seeking
- Perceptions of risk
- Health and mental health care needs
- HIV risk
- Return to drug use

Analysis: Team based, constant comparative analysis & member checking

Binswanger, et al, Intl J Law Psychiatry, 2011  
Binswanger, et al., Addict Sci Clin Pract, 2012  
Adams et al., JAIDS, 2011



# Emotional responses: Disappointment

I wasn't really worried when I got out because I thought everything would be OK.

But then when I got out here, it just seemed like every[thing], [from] the prison door right to the sidewalk, everything went downhill.

# Ubiquitous exposure to drugs post-release

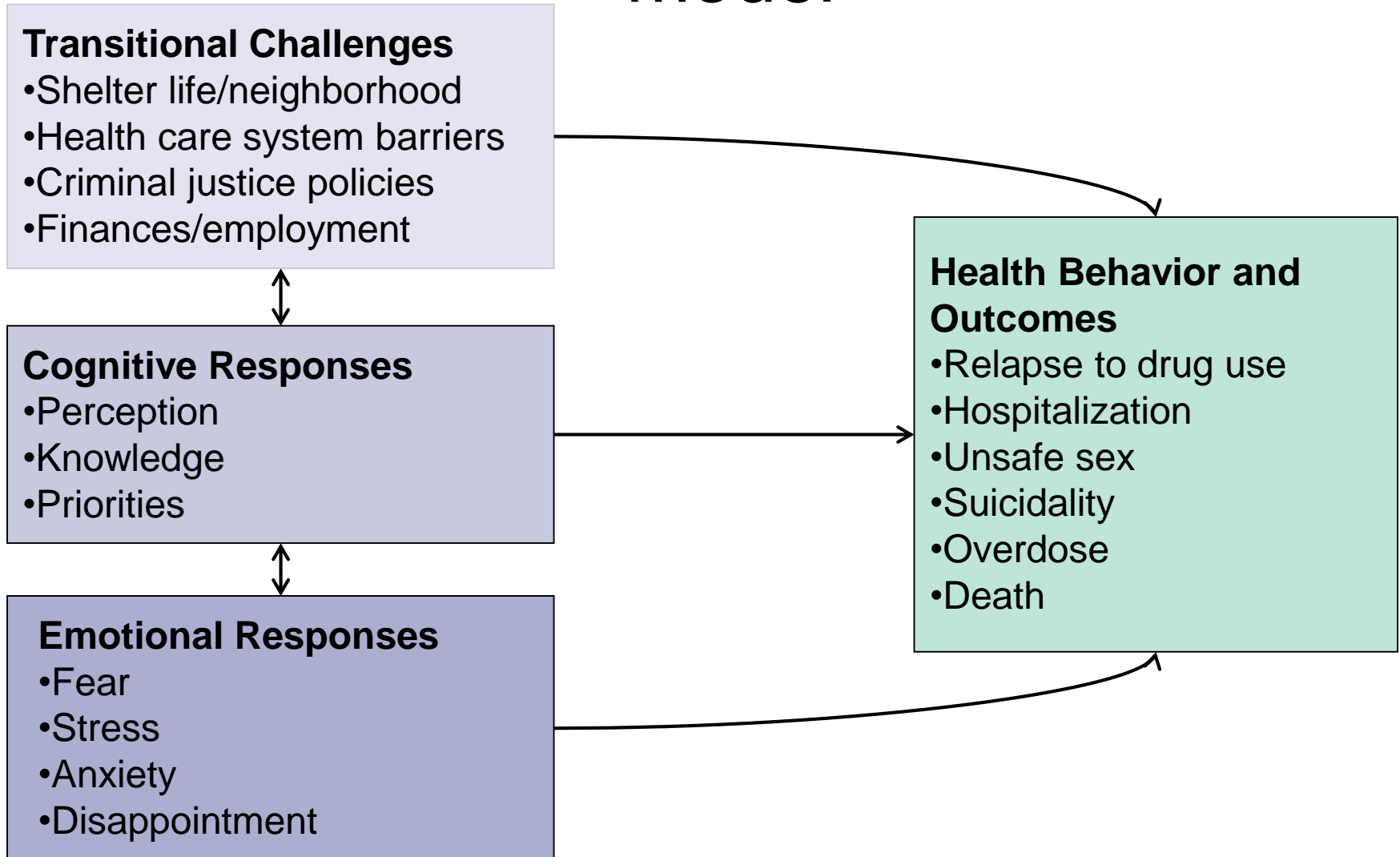
You get asked 50 times if you want some coke before you get into the [shelter] door.

Binswanger, et al., Addict Sci Clin Pract, 2012;

# Contributors to poor post-release health outcomes

- Lack of structure upon release
- Limited continuity of care and pharmacotherapy for physical, mental health needs, and addiction
- Constant triggers to use alcohol and drugs
- High stress, anxiety and disappointment

# Qualitative study: resultant thematic model



# Prospective cohort study: HIV risk behaviors after release from prison

- Goal: examine time trends in HIV risk behaviors
- Participants: 200 former inmates recruited 2 weeks of release and followed for 3 months, oversampled women
- Methods: Baseline and follow up surveys

# HIV risk behaviors after release from prison: Findings

- High prevalence of HIV risk behaviors post-release, esp. among women
- Risk behavior persistent (not same time trends)
- Individuals who engaged in more baseline risk behaviors more likely to be re-incarcerated
  - *What are the implications?*

# HIV risk behaviors after release from prison: Findings

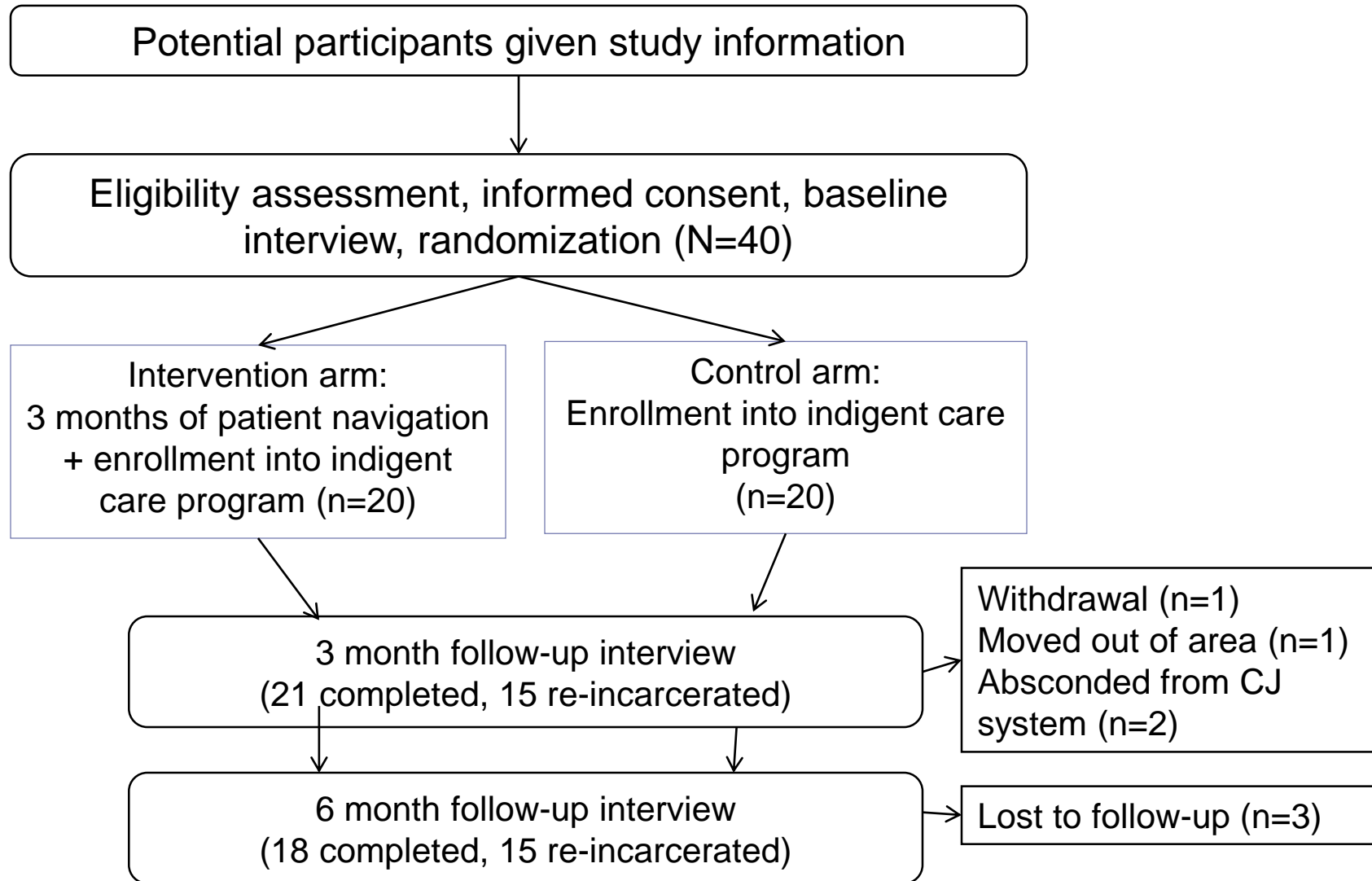
- High prevalence of HIV risk behaviors post-release, esp. among women
- Risk behavior persistent (not same time trends)
- Individuals who engaged in more baseline risk behaviors more likely to be re-incarcerated
  - *What are the implications?*
- 1 death after eligibility screening & 1 before follow-up
  - *What does that mean to you?*

# Randomized Controlled Trial: Patient navigation for people released from prison

- Aim: Test the feasibility of a patient navigation intervention during the transition from prison to the community
- Goals of intervention
  - Reduce barriers to care
  - Enhance linkage with primary care
  - Ensure prescription medication continuity
  - Reduce emergency department visits and hospitalizations



# Release from prison



# Conclusions for pilot RCT

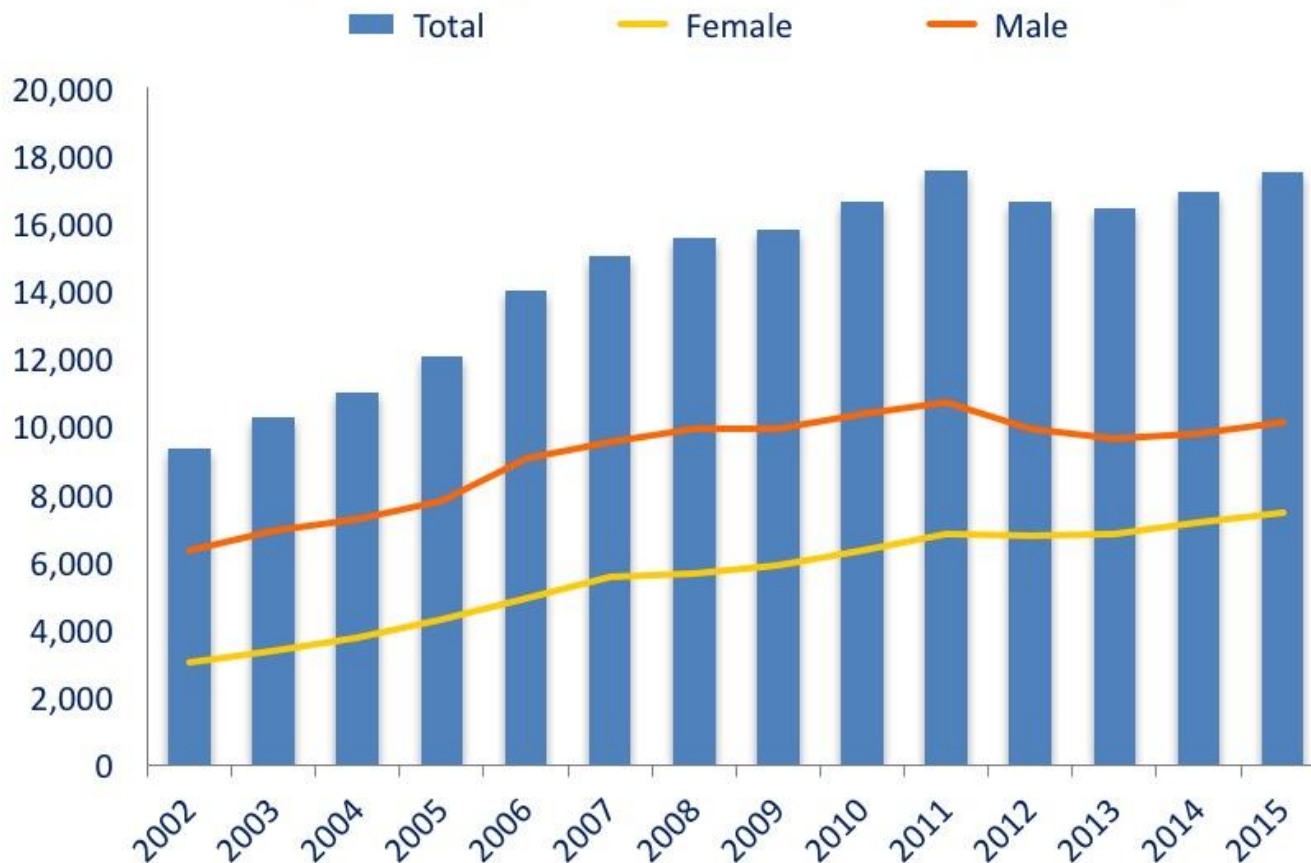
- RCT of patient navigation promising
  - Productive collaboration with criminal justice agency and public health hospital
  - Easily recruited former inmates in immediate post-release period
  - Had significant effect on barriers to care and hospitalizations
- Follow-up complex
  - Repeat incarcerations in over a third at 3 and 6 months
  - Additional true losses: absconding, withdrawal & loss of contact

# Study designs employed to examine transition from prison to the community

1. Retrospective cohort
2. Nested case control
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# National Overdose Deaths

Number of Deaths from Prescription Opioid Pain Relievers  
(excluding non-methadone synthetics)

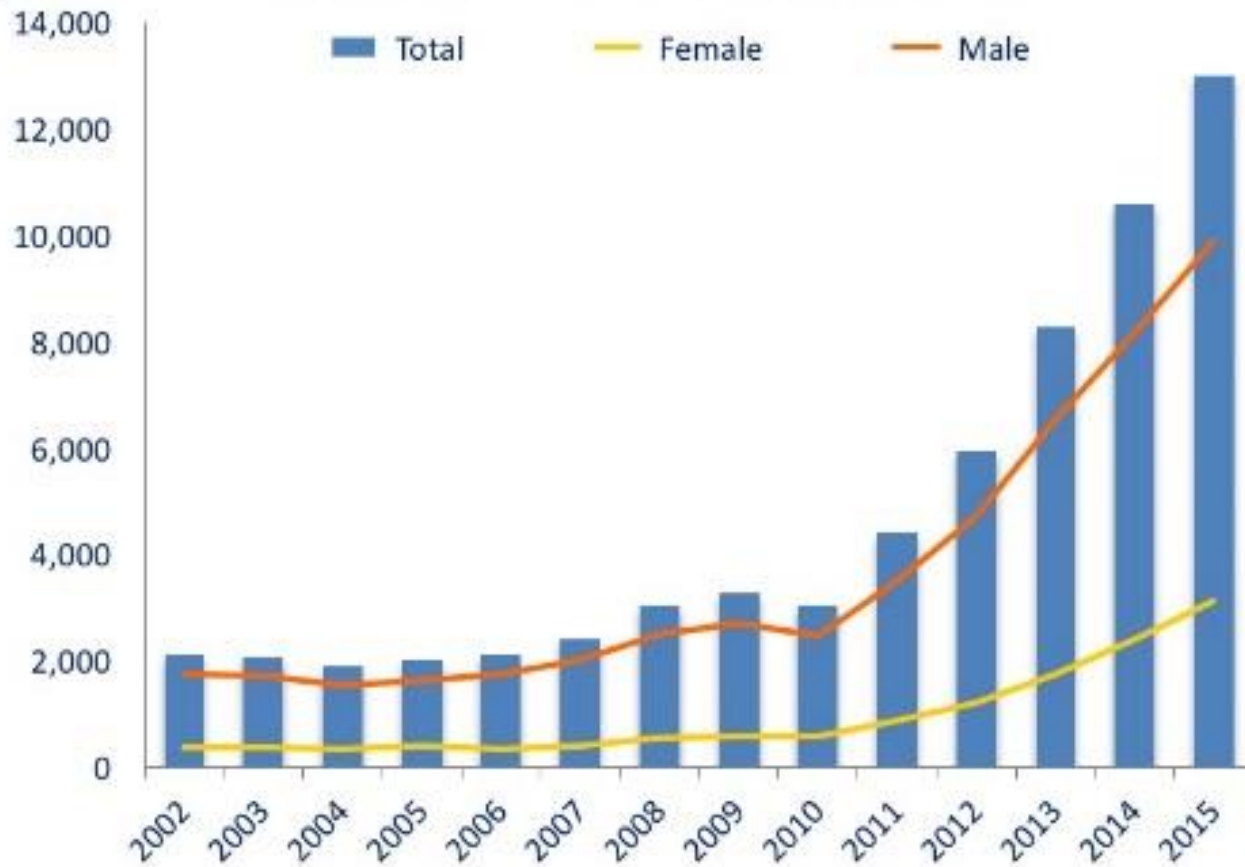


Source: National Center for Health Statistics, CDC Wonder



# National Overdose Deaths

## Number of Deaths from Heroin



Source: National Center for Health Statistics, CDC Wonder

# Application to today

*What are the lessons learned from this research in the criminal justice system?*

*How would you apply this knowledge to the current opioid epidemic?*

# Transitions risky for overdose

- Tolerance to opioids develops rapidly
- Potency is highly variable
- Transitions between settings risky
  - Release from prison
  - Discharge from hospitalization
  - Beginning buprenorphine or methadone treatment
  - Discharge from detoxification treatment
  - Postpartum period

Binswanger, et al., NEJM, 2007; Merrall, et al., Addiction, 2013; Merrall et al., Merrall et al., Addiction, 2010; Corish et al., BMJ, 2010; Metz et al., Obstet Gynecol 2016

# Methodologic issues studying overdose

- Choosing meaningful outcomes
- Choosing appropriate comparison groups
- Timing of measurements relative to setting transitions
- Missing data not at random
- Informative loss-to-follow-up
- Use of rigorous epidemiologic methods for causal inference



# Current projects

- Two pragmatic randomized trials of naloxone interventions for patients on chronic opioid therapy (NIDA R01, PIs Binswanger/Glanz)
- Assessing the unintended consequences of opioid tapering (CDC U01, PIs Binswanger/Glanz)
- Identifying heroin use and outcomes in electronic health record data (NIDA R56, PIs Glanz/Binswanger )
- Examining overdoses in prisons and jails (DOJ PI Binswanger)
- Health framework for national criminal justice collections on health (DOJ, PI Binswanger)
- Consequences of sanctions study (NICHD R01, PI Morenoff)
- KPCO opioid overdose surveillance System (PI Binswanger)

# Thank you

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