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# PHD Active & Completed Analytic Projects

## Active PHD Projects

### Leveraging Perinatal Touchpoints to Improve the Hepatitis C Virus and Opioid Use Disorder Care Cascades

**Project Lead:** Rachel Epstein (BUSM/BMC)

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**Project Team:** Jenny Wang (BUSPH), Michelle Weitz (BMC), Benjamin Buzzee (BMC), Laura White (BUSPH), Megan Curtis (MGH, HMS), Benjamin Linas (BUSM/BMC), Alex Walley (BUSM/BMC), Kelley Saia (BUSM/BMC), Davida Schiff (MGH), Ryan O'Dea (BU), Breanne Biondi (BU), Sarah Schumacher (BMC)

#### Project Aims:

Perinatal care provides longitudinal access to women over a nearly one-year period, and pregnancy may be a motivating time for women to address health care needs. This study will test the overarching hypothesis that engagement with perinatal care improves both OUD and HCV outcomes and then employ simulation modeling to project long-term outcomes, cost, and cost-effectiveness of policies and interventions focused on addressing OUD and HCV in perinatal care.

1. Measure the impact of perinatal care on OUD and HCV treatment engagement. I will utilize the Massachusetts Department of Public Health's Data Warehouse, with its novel linkage of claims, first responder, and public health data to test the **hypotheses** that compared with age- and calendar time-matched women with OUD without a past 2-year perinatal care touchpoint, women with OUD who access perinatal care **1a)** are more likely to initiate OUD medication, but ultimately have higher 2-year rates of overdose due to post-partum declines in retention, and **1b)** have higher HCV cure rates.
2. Create a simulation model, Perinatal care as a Venue To reduce Opioid overdoses and HCV incidence (PreVent OD HCV), to identify cost-effective interventions to increase OUD and HCV treatment initiation and retention in the perinatal period and to project long-term outcomes associated with candidate interventions and public health investments into treatment delivery in the perinatal setting. I will use the model to test two **hypotheses: 1a)** Post-partum 6- and 12-month retention on medications for OUD must at least double to reduce post-partum overdose deaths by 40%, and **1b)** Increasing linkage to HCV treatment post-partum to at least 75% is necessary to translate universal prenatal screening recommendations into decreased population-level transmission.

## Comparing MOUD Effectiveness: An Emulated Trial

**Project Lead:** Marc LaRochelle (BMC/BUSM)

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**Project Team:** Shapei Yan (BMC), Sarah Kosakowski (BMC), Alex Walley (BMC/BUSM), Sara Lodi (BUSPH), Jane Liebschutz (UPMC), Joshua Lee (NYU), Patricia Novo (NYU), John Rotrosen (NYU), Radhika Puppala (BMC), Paul Christine (CUAnschutz), Jiayi Wang (BMC)

#### Project Aims:

1. Compare estimates of sublingual buprenorphine (SL-BUP) and extended-release naltrexone (XR-NTX) retention following opioid detoxification in the X:BOT trial, a randomized control trial of sublingual buprenorphine SL-BUP versus XR-NTX, with an emulated trial in the Massachusetts Public Health Data warehouse (PHD).
2. Conduct an emulated trial of the impact of initiating SL-BUP versus XR-NTX on opioid overdose following opioid detoxification.

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3. Conduct an emulated trial of the impact of initiating injectable buprenorphine (BUP-XR) versus SL-BUP on retention and opioid overdose following opioid detoxification.
4. Use an emulated trial to assess the impact of tapering SL-BUP after 12 weeks versus ongoing treatment on opioid overdose following opioid detoxification.

### Researching Effective Strategies to Prevent Opioid Death (RESPOND): updating simulation model parameters (RESPOND)

**Project Lead:** Benjamin P. Linas (BU/BMC)

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**Project Team:** Jenny Wang (BMC), Sabrina Assoumou (BMC/BUSM), Marc LaRochelle (BMC/BUSM), Mathieu Castry (BMC), Stavroula Chrysanthopoulou (Brown University), Laura White (BUSPH), Ryan O'Dea (BU), Benjamin Buzzee (BMC), Rachel Epstein (BUSM/BMC), Hana Zwick (BMC), Breanne Biondi (BU), Caroline Savitzky (BMC), Matthew Carroll (BMC)

#### Project Aims:

- The specific aim of this analysis is to update the analyses done previously to inform the RESPOND model with more recent data. This includes estimating the prevalence of OUD in Massachusetts, calculating the rate of fatal and non-fatal overdoses, and estimating admissions into residential and detox treatment facilities. Additionally, analyses will now be stratified by race/ethnicity and housing status.

### Cost Savings for Medications for Opioid Use Disorder (MOUD)

**Project Lead:** Malena Hood

**Project Team:** MassHealth, Dana Bernson (DPH)

#### Project Aims:

1. What is the prevalence of the population with opioid use disorder (OUD) in Massachusetts that is receiving Medications for Opioid Use Disorder (MOUD)?
2. What is the impact of MOUD for people with OUD? Health care utilization?
3. Are there cost savings associated with MOUD?

### HEALing Communities Study (HCS)

**Project Lead:** Jeffrey Samet

**Project Team:** Marc LaRochelle (BMC/BUSM), Sarah Kosakowski (BMC), Shapei Yan (BMC)

#### HCS Analytic Plan 3 Project Aims:

- For HCS community residents that died of an opioid-related overdose, how many experienced detox/opioid related EMS runs/non-fatal opioid overdose 12 months prior to death?

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### Effects of the Supplemental Nutrition Assistance Program (SNAP) on racial/ethnic and disability-based healthcare disparities

**Project Lead:** Rajan Sonik (Alta Med)

**Project Team:** Benjamin Cook (CHA/HMS), Brian Mullin (CHA), Michael Flores (CHA), Monika Mitra (Brandeis), Vicki Fung (MGH), William Crown (Brandeis), Rujuta Takalkar (CHA), Erin Britton (Brandeis), John Hsu (MGH/HMS), Bianca Porneala (Brandeis), Natalie Moresco (Brandeis)

**Project Aims:**

1. Disease prevention and management, including outpatient utilization and patient adherence to therapy (e.g., preventive outpatient visits; medication adherence);
2. Unfavorable clinical events, including rates of emergency department visits and hospitalizations, particularly those related to poor disease management (e.g., complications related to low/high blood sugar); and
3. Healthcare expenditures: including total spending and component spending for prevention and management, emergency care, and inpatient care.

### Predict to Prevent: Dynamic Spatiotemporal Analyses of Opioid Overdose to Guide Pre-Emptive Public Health Responses

**Project Lead:** Thomas Stopka (Tufts)

**Project Team:** Cici Bauer (University of Texas), Marc Larochelle (BU/BMC), Wenjun Li (UMass Lowell), Leland Ackerson (UMass Lowell), Dana Bernson (MDPH), Olaf Dammann (Tufts), Ric Bayly (Tufts), Xiaona Li (University of Texas), Jack Cordes (Tufts), Ghada Hassan (University of Texas), Meng Zhang (UMass Lowell), Angela Consentino (UMass Lowell), Shikhar Shrestha (Tufts), Jiahao Cao (UTHealth)

**Project Aims:**

- 1) Develop a Bayesian multilevel spatiotemporal model to identify individual, interpersonal, community, and societal factors that contribute to opioid OD;
- 2) develop an efficient Bayesian spatiotemporal model to identify time-space OD clusters, and extend the model to construct a dynamic predictive model; and,
- 3) evaluate and predict policy and intervention effects through model-based simulation studies to provide practical guidance and decision-making support to public health officials. Aims 1, 2 and 3 can be easily adopted and reproduced by users in other public health jurisdictions and sectors to foster cross-sector, cross-agency opioid OD control. A secondary aim is to assess whether ZIP Code level access to MOUD varies with measures of geographic disparity (social determinants of health) through statistical modeling.

## MCH Analyses

**Topic 1:** Severe Maternal Morbidity

**Project Lead:** Malena Hood (MDPH)

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**Project Team:** Jiankun Kuang (MDPH), Fareesa Hasan (MDPH), Xiaohui Cui (MDPH), Fifi Diop (MDPH), Sarah Stone (MDPH), Matthew Horan (MDPH), Xiao Guo (MDPH), Jing Guo (MDPH)

**Project Aims:**

- Examine prevalence and characteristics associated with SMM among priority population including women of reproductive age (WRA) and how multiple factors intersect to increase risk for some groups. 3 time periods: At delivery, Antenatal, Postpartum

**Topic 2:** Access to/utilization of care

**Project Lead:** Amy Bettano (MDPH)

**Project Team:** Chiara Moore (MDPH), Dana Bernson (MDPH), Marianina Stewart (MDPH), Malena Hood (MDPH), Fifi Diop (MDPH), Sarah Stone (MDPH)

**Project Aims:**

- Examine differences among priority populations in the proportion of women accessing health services: Preventive care (inter conception/preconception care- Preventive care for WRA is a current Title V priority) and after delivery (hospital readmissions, ED visits and observational stays in the first 6 weeks/year post-birth among women with live births).

**Topic 3:** Pregnancy-associated mortality

**Project lead:** Elizabeth Erdman (MDPH)

**Project Team:** Chiara Moore (MDPH), Xiaohui Cui (MDPH), Marianina Stewart (MDPH), Malena Hood (MDPH), Fifi Diop (MDPH), Sarah Stone (MDPH)

**Project Aims:**

- Examine prevalence and characteristics associated with pregnancy-associated mortality among priority populations and how multiple factors intersect to increase risk for some groups.

## Explicating Disparities in the Impact of PTSD on Opioid Use, Disorder, and Treatment Outcomes

**Project Lead:** Natrina Johnson (BUSPH)

**Project Team:** Danielle Haley (BUSPH), Laura White (BUSPH), Jake Morgan (BUSPH), Bruce Schackman (Cornell Medicine), Amy Yule (BU/BMC)

**Project Aims:**

- **Aim 1:** To describe differences in healthcare utilization and outcomes for people who have documented OUD with and without co-occurring PTSD during a one-year observation period between the years 2014 and 2018.
  - **H1:** People with co-occurring OUD-PTSD will utilize less routine outpatient services (e.g., office-based addiction treatment), more non-routine services (e.g., hospitalizations), and have higher incidence of poor outcomes (e.g., fatal and non-fatal overdose) compared to people with OUD who do not have PTSD.
- **Aim 2:** To determine relationships between community-level social economic factors and continuity of OUD treatment for people with OUD who do and do not have co-occurring PTSD, by incorporating contextual community-

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level data (e.g., the American Community Survey) into multilevel modeling to investigate differences in health utilization and outcomes. We will also *explore* the potential of creating a measure of neighborhood incarceration rates by aggregating person-level data from the HOC dataset, and a measure of geographic access to substance use treatment by census tract to incorporate in analyses.

- **H2:** People with OUD living in geographical areas with lower rates of racial segregation, lower rates of household crowding, and lower rates of education below the 9<sup>th</sup> grade level, will have longer continuity of MOUD, but the association will be attenuated among patients with co-occurring PTSD.
- **Aim 3:** Among people with PTSD-OUD, to forecast differences in costs of healthcare utilization among those who utilize MOUD and psychotherapeutic treatment versus MOUD alone.
  - **H3:** People with co-occurring OUD-PTSD who utilize both MOUD and psychotherapeutic treatment will have lower costs associated with ED visits and hospitalizations compared to people with OUD-PTSD who utilize MOUD alone.

## BSAS Access to Treatment (ATR) Client Health Outcomes and Utilization of Treatment & Public Services

**Project Lead:** Hermik Babakhanlou-Chase (MDPH) & Christopher Massad (MDPH)

**Project Team:** Marc LaRochelle (BUSM), Nicole Schmitt (MDPH), Sarah Ruiz (MDPH)

### Project Aims:

- **Incarceration:**
  - What is the frequency and incidence rate of incarceration/recidivism to the criminal justice system prior to, during, after ATR?
  - How much time do ATR clients spend incarcerated prior, during, after ATR?
  - How do these measures vary by in time (e.g. before COVID-19 pandemic as compared to during/after and other possible change points)?
  - How do these measures vary by sociodemographic differences?
  - How do these measures vary by ATR disenrollment reason and length of engagement in ATR?
  - How do these measures compare to other BSAS client populations such as residential and other BSAS services?
- **EMS, ED, Inpatient:**
  - What is the frequency and incidence rate of EMS events (opioid and non-opioid related) for ATR clients prior to, during, and after ATR?
  - What is the frequency and incidence rate of ED admissions (opioid and non-opioid related) for ATR clients prior to, during, and after ATR?
  - What is the frequency and incidence rate of Inpatient hospital admissions (opioid and non-opioid related) for ATR clients prior to, during, and after ATR?
  - How do these measures vary by in time (e.g. before COVID-19 pandemic as compared to during/after and other possible change points)?
  - How do these measures vary by sociodemographic differences?
  - How do these measures vary by ATR disenrollment reason and length of engagement in ATR?
  - How does BSAS service utilization compare to other BSAS client populations such as residential and other BSAS services?
- **Mortality:**
  - What is the absolute and age-adjusted client mortality rate?
  - What is the opioid-related and poisoning mortality rate(s)?
  - How does the death rate vary based in time from ATR enrollment start/end dates (relative to the client)?
  - How do these measures vary across in (absolute) time (e.g. before COVID-19 pandemic as compared to during/after and other possible change points)?
  - How does the client death rate vary by sociodemographic differences?

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- How does the client death rate vary by ATR disenrollment reason and length of engagement in ATR?
  - How does the client death rate compare to other BSAS client populations such as residential and other BSAS services?
- Sequence of Events:
  - On an individual(s) basis, what combinations, order of events, and time between events do ATR and BSAS clients realize in way of BSAS admissions, incarceration, EMS/ED/Inpatient events, and mortality?

## Disability Community Health Needs Assessment

**Project Lead:** Nassira Nicola, Deputy Director, OHE

**Project Team:** Kimberley Warsett (DPH), Nicholas Griffiths (DPH), Amy Bettano (DPH), Bianey Ramirez (DPH)

### **Project Aims:**

Overall, the aim of this project is to provide descriptive statistics on the experiences of individuals with disabilities in Massachusetts. These results will be compared to other statewide analyses such as the COVID Community Impact Survey (CCIS) and BRFSS.

1. Aim 1 is a descriptive analysis of individuals with disabilities in the PHD, including frequencies of the overall population with disabilities and populations by disability category. Demographic and socioeconomic characteristics will be analyzed, including age, race/ethnicity, sex, geographical distribution, rurality, insurance coverage (public versus private), history of incarceration, housing status, and institutionalization status.
2. Aim 2 is a descriptive analysis of healthcare access and utilization among individuals with disabilities, an analysis of the percent with chronic and secondary health conditions, the percent with diagnosed substance use disorders, the percent impacted by injury and violence, and the percent impacted by COVID-19.

## Adverse Health Consequences of Risky Prescription Stimulant Use

**Project Lead(s):** Lauren Moran, MD MPH, Alex DeNadai, PhD

**Project Team:** Ekta Patil (McLean), John Hsu (Harvard), Scott Weiner (Harvard), Brain Healy (Harvard), Alex DeNadai (McLean), Ryan Zamora (McLean)

### **Project Aims:**

**Aim 1** –To assess the impact of high risk prescription stimulant use on the risk of transitioning to illicit psychostimulants methamphetamine/cocaine and poly-substance use disorders (poly-SUD)

We will examine impact of high risk prescription stimulant use on all drug-related non-fatal and fatal overdoses, with specific focus on the role of poly-SUD involving opioids and multiple drug types (e.g., illicit psychostimulants, fentanyl, etc)

**Aim 2** –To assess the impact of high risk prescription stimulant use on incident psychosis.

For these Aims, we will examine individual, social, policy, and care-related factors associated with drug-related adverse events (non-fatal and fatal overdoses; psychosis).

**Aim 3** –To use a data-drive method, group-based trajectory analysis, to identify groups of individuals with similar stimulant prescribing patterns and compare the risk of non-fatal/fatal overdoses and psychosis among these groups.

High risk prescription stimulant use will be defined as: 1) daily dose of  $\geq 30$  mg dextro-amphetamine equivalents; 2) utilization of multiple prescribers and pharmacies resulting in  $\geq 3$  overlapping stimulant prescriptions (doctor/pharmacy shopping); or 3) co-prescribing of stimulants with opioids and/or benzodiazepines.



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## Disparities in PrEP, and Screening and Treatment for HIV, and RElated Health Outcomes

**Project Lead:** Liisa Randall, Director, Office of Health Care Planning, Bureau of Infectious Disease and Laboratory Sciences.

**Project Team:** Catherine Brown (DPH), Linda Goldman (DPH), Laura Platt (DPH), Andrew Tibbs (DPH), Monica Morrison (DPH), Roksolana Hovdey (DPH), Betsey John (DPH), Anthony Osinski (DPH)

**Project Aims:**

1. Assess responsiveness to prevention, screening, and treatment guidelines and recommendations, in the areas of HIV and hepatitis C (HCV) screening and treatment, and HIV PrEP uptake, focused on PWID.
1. Describe differences in practice and care, including continuity of care and health outcomes in terms of race and ethnicity, age, gender, housed status, history of incarceration, payer and provider characteristics, geography, and over time.
2. Identify and describe gaps or “missed opportunities” for PrEP, HIV and HCV screening, and HIV and/or HCV treatment that may be appropriately addressed through public health investment and/or policy reform.

## Assessment of Alcohol Use Disorder and Problematic Alcohol Use

**Project Lead:** Amy Bettano (DPH)

**Project Team:** Dana Bernson (DPH), Kuangying Chen (Tufts)

**Project Aims:**

- Determine the prevalence of
  - Alcohol use disorder (AUD)
  - Alcohol-related incidents
  - Infants/Newborns exposed to alcohol
  - Treatment for AUD
- Calculate how many people with AUD also have evidence of other substance-related use disorders (specifically Opioid Use Disorder and/or opioid overdoses, and stimulant use disorders)?

## Section 138 Analysis

**Project Lead:** Benjamin Bovell-Ammon (Baystate Medical Center/Umass)

**Project Team:** Shapei Yan (BMC), Linnea Evans (UMass), Elizabeth Evans (UMass), Peter Friedmann (Baystate/UMass), Marc Larochelle (BMC/BUSM), Alexander Walley (BMC/BUSM/BSAS), Sarah Bagley (BMC/BUSM), Alicia Ventura (BMC), Jessie Calihan (BMC), Aaron Sarvet (UMass)

**Project Aims:**

- **Aim 1:** Describe the individual characteristics, treatment and aftercare, and post-acute treatment outcomes among cohorts of people civilly committed to substance use disorder (SUD) treatment under Section 35 (S.35), people voluntarily entering SUD treatment, and people with OUD in acute crisis not accessing treatment. Specifically, we will consider the following items (not necessarily an exhaustive list):

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- **Patient characteristics:** including SUD type, polysubstance use, age, gender, pregnancy, race/ethnicity, homelessness, incarceration history, co-occurring mental illness, insurance coverage, geography (rurality, region);
- **For youth/young adults (ages 13-21):** describe, if possible, DCF/DYS involvement
- **Index treatment episode:** including length of stay; level of care (if available, e.g. ATS vs. CSS)
- **Post-release care (aftercare):** subsequent SUD program enrollment (CSS, residential, outpt); for patients with OUD: receipt of medications for opioid use disorder (MOUD)
- **Primary Outcomes:** fatal and nonfatal opioid-related overdose
- **Secondary Outcomes:** all-cause mortality, incarceration, post-acute MOUD receipt and residential treatment; repeat S.35 commitment; medical & psychiatric hospitalization
- **Sub-Aim 1a:** Compare these measures between involuntary (S.35) treatment admissions, voluntary SUD treatment admissions of a similar level of care, and acute crisis episodes without treatment.
  - **Sub-Aim 1b:** Describe these measures by race/ethnicity, gender, and age categories and including intersectionality.
  - **Sub-Aim 1c:** Compare these measures across S.35 treatment sites, i.e. the 10 different sites overseen by 4 different agencies (DPH/BSAS, DMH, DOC, and Hampden County HOC).
  - Given the diversity of programs and sites (4 different agencies overseeing a total of 10 sites) and the statistical challenges of multiple comparisons in a finite sample, we will describe the variation in characteristics and outcomes across sites without applying the causal inference methods that we apply to the other questions in this analysis.
- **Aim 2:** Evaluate the effectiveness of involuntary (S.35) SUD treatment vs. voluntary SUD treatment (of a similar level of care) for the outcomes of fatal and nonfatal opioid-related overdose, using two different study designs to address confounding.
  - **Sub-Aim 2a:** Conduct a head-to-head comparative effectiveness study between all involuntary and voluntary treatment admissions, using propensity score weighting to adjust for measured confounders. Applying the target trial emulation framework, we will align the timing of study eligibility, treatment assignment, and the start of follow-up time for each eligible observation at the index admission to SUD treatment (either voluntary or involuntary) and assess subsequent outcomes between the two groups.
  - **Sub-Aim 2b:** Conduct a crossover cohort study among patients who had episodes of both types of SUD treatment (with a sufficient 'washout' period in between), to compare the effectiveness of involuntary (S.35) vs. voluntary SUD treatment (of a similar level of care). We again would employ the target trial emulation framework but with a different study design to complement the head-to-head study in 2a above. The crossover study design adds an additional strategy for reducing potential confounder bias by allowing each individual to serve as their own control (or counterfactual), and we will still control for confounders that might vary between treatment episodes for the same individual.
- **Aim 3:** Evaluate involuntary SUD treatment (S.35), compared to not being civilly committed to involuntary treatment, among individuals who had survived an opioid-related overdose in the preceding week, for the outcomes of fatal and nonfatal opioid-related overdose. Similar to Aim 2, we would apply the target trial emulation framework and use propensity score weighting to adjust for measured confounders. Because many individuals who were civilly committed to involuntary treatment would not have voluntarily sought treatment at that time, this aim would consider that counterfactual—in other words, the impact of Massachusetts not having the S.35 policy in place. To be civilly committed under S.35, a court must have determined that someone's substance use was sufficiently dangerous at that time, so using nonfatal overdose as the index event (required for inclusion in either treatment arm of the study) will facilitate the selection of a control group whose OUD was likely to be in a similar stage of severity at that time. We might also consider additional types of OUD-related crises as index events depending on feasibility (see details in Analytic Plan below).

### Descriptive factors of non-fatal gunshot wounds versus fatal gunshot wounds

**Project Lead:** Devon Dunn (MADPH)

**Project Team:** Devon Dunn (MADPH), Amy Bettano (MADPH), Elizabeth Pino (BMC), Megan Georges (BMC)

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### Project Aims:

What is the prevalence of:

- i. Non-fatal gunshot wounds (GSW)
- ii. Fatal gunshot wounds

Additional analyses:

- i. Medical needs after GSW– number of visits to the ED within a year after GSW?
- ii. Recurrent firearm injuries
  - a. Are individuals who have been victims once more likely to be victims additional times?
  - b. More likely to have fatal GSW?
- iii. Encounters with the DOC/HOC before vs. after the injury?
- iv. What is the manner of firearm injury? Assaultive, unintentional, self-inflicted, legal intervention?

### Characteristics of prescription opioid use among injured workers

**Project Lead:** Kathleen Grattan (MADPH)

**Project Team:** Emily Sparer-Fine (MADPH), Kathleen Fitzsimmons (MADPH)

### Project Aims:

1. What is the prevalence/percent of certain risk factors\* among work-injured MA residents who filed lost-wage, indemnity claims with the DIA and subsequently had opioid scripts filled.

\*experienced more than 1 work injury; opioid naïve status; opioid use duration/dosage

- 1b. How does the prevalence of these factors vary by industry and/or occupation?
2. Among injured workers who are prescribed opioids for a work-related injury, are those with prescriptions filled for long-term or high dose opioids more likely to develop OUD than those with prescriptions filled for short-term or low dose opioids? Do these effects vary by industry and/or occupation?
3. Among working-age adults (18-64 yrs.) who were injured and treated/triaged in the emergency department, how do those with a work-related injury compare to those with a non-work-related injury with respect to opioid use, opioid use duration, opioid use dosage, OUD, treatment for opioid dependence (MOUD) and non-fatal opioid-related overdose following emergency department discharge? (prospective study to occurrence of outcomes)

### Measuring the reach of Covid-19 vaccine access among people with disabilities in Massachusetts in 2021

**Project Lead:** Arielle Coq (MDPH), Cecilia Vu (MDPH)

**Project Team:** Nassira Nicola (MDPH), Bianey Ramirez (MDPH), and Nick Griffiths (MDPH), Amy Bettano (MDPH), Elizabeth Russo (MDPH), Kathryn Ahnger-Pier (MDPH), Joshua Norville (MDPH), Madison Lyman (MDPH), and Boudu Bingay (MDPH).

### Project Aims:

Our analytical goals are to measure the proportion of people with a disability in Massachusetts who received one Covid-19 vaccine from February to July 2021 using the MDPH Public Health Data (PHD) Warehouse. Specifically, we aim to:

1. Measure the type of vaccination sites that people with a disability accessed (i.e. mass vaccination sites, traditional office/ pharmacy locations, and other sites)

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2. Describe vaccination site access among people with a disability disaggregated by type of disability (i.e. intellectual and mobility disability)
3. Describe vaccination site access among people with a disability by age and race/ethnicity

### Differences in Prescribed Stimulant Medications by Demographic Characteristics: Pre- and Post-COVID-19 Response

**Project Lead:** Netrali Dalvi, Prescription Monitoring Program (PMP), Bureau of Health Professions and Licensure (BHPL).

**Project Team:** Danielle Valerio (MDPH), Leonard Young (MDPH), David Johnson (MDPH), James Lavery (MDPH), Ziming Xuan (BUSPH), Nassira Nicola (MDPH), Humberto Reynoso (MDPH), Perla Roberts (MDPH), Lorraine Anyango (MDPH), Chiara Moore (DPH)

**Project Aims:** Objective 1: Examine characteristics of patients who receive stimulant dispensations, including diagnosis codes, race/ethnicity, SES, sex, and age.

Objective 2: Assess stimulant prescribing patterns in relation to these patient characteristics prior to and post-Covid-19 emergence in Massachusetts using Interrupted Time Series analyses.

Objective 3: Identify associations between stimulant use and health outcomes, including ED visits and hospitalizations, fatal/non-fatal overdoses, and mental health and neurological outcomes.

### ID Touch

**Project Lead:** Alysse Wurcel, MD, MS (Tufts Medical Center)

**Project Team:** Alma Bartnik (UMASS), Angie Mae Rodday (Tufts), Liz Evans (Umass Amherst), Linnea Evans (Umass Amherst), Peter Friedmann (Baystate), Kaitlyn Jaffe (UMASS), Brindet Socrates (BMC), Slmeon Kimmel (BMC), Alex Walley (BMC),

**Project Aims:**

The PHD will be used during Year 1 in Aim 1b, and then in years 2-5 for Aims 2 (measuring effectiveness of ID-Touch and Aim 4 (measuring cost of ID-Touch)

1. 1B: We want to analyze existing administrative data, which has been linked to the MA PHD Warehouse, on all incarcerated individuals with OUD released from the Suffolk jail system in 2019-2020 (n=2,360), with the inclusion of 2020-2021 data when available, to identify interactions with healthcare and other human services agencies (i.e., touchpoints) for achieved or missed HIV care prior to jail entry, during incarceration, and after release. Preliminary analyses have been completed under Mass JCOIN on pre-incarceration touchpoints among individuals who were and were not treated with MOUD while incarcerated. We will assess post-release touchpoints, assist MDPH and Suffolk jails to include existing data from the jails' electronic health records on HIV testing during incarceration in PHD warehouse data linkage for analysis, and analyze existing data in the PHD warehouse on use of HIV healthcare and PrEP before and after incarceration. Results will be reviewed by the Community Advisory Board (CAB) to further refine ID-TOUCH. Finally, during the developmental phase, we will recruit and train staff, and establish procedures for data quality assurance, encryption, and transfer.
2. AIM 2: We want to conduct a longitudinal quasi-experimental outcome study that utilizes the

## PHD Active & Completed Analytic Projects

PHD Warehouse. We will identify approximately 3,500 inmates with OUD released from the 2 participating Suffolk jails during the first 18 months after initiation of ID-TOUCH. PHD data received during the last year of the grant period will allow assessment of outcomes associated with receipt of in-jail HIV testing during the year after community reentry. We will compare the outcomes of individuals with OUD who were exposed to ID-TOUCH during incarceration (2025-2026 Suffolk releases) to the outcomes of individuals with OUD released before ID-TOUCH implementation (2022-2024 Suffolk releases) and in relation to the outcomes of individuals with OUD released from Middlesex jails, a nearby, comparable, and contemporaneous jail system not involved in ID-TOUCH that will serve as a non-intervention control site (2025- 2026 Middlesex releases). We will also assess intervention outcomes in relation to variability in site-level implementation practices across sites. We will focus on the outcomes of individuals who are HIV negative at release and compare them to the outcomes of individuals with an unknown HIV status.

### Sec 138 supplemental analysis

**Project Lead:** Davida Schiff, MD (MGH)

**Project Team:** Julia Reddy (UNC), Timothy Nielsen (University of Sydney), Nichole Nidey (Ulowa), Shapei Yan (BMC), Adrian Caiazzo (MGH)

**Project Aims:**

Aim 1a: Describe the prevalence of the use of civil commitment among pregnant and postpartum individuals with substance use disorder in Massachusetts, comparing with the rate of civil commitment to reproductive-aged women with substance use disorder without a pregnancy in the past year. Hypothesis: Pregnant and postpartum individuals will have higher rates of civil commitment for substance use than other reproductive-aged women.

Aim 1b: Stratify civil commitment prevalence data by key characteristics, including age, race/ethnicity and EOHHS region. Hypothesis: Civil commitment will be used disproportionately by key demographic characteristics including non-white race/ethnicity, urban region, and younger age.

Aim 2: Evaluate the extent to which civil commitment is associated with fatal and non-fatal overdose in the year following delivery among pregnant and postpartum individuals.

Aim 3: Evaluate the extent to which the use of civil commitment among pregnant and postpartum individuals has been lessened by the development of novel supportive co-located treatment services for pregnant and postpartum people in MA.

### HCS Analysis 4 – Emulated trial of the impact of implementing addiction consult services or bridge clinics in hospitals and emergency departments in HCS communities on post-discharge MOUD use

**Project Lead:** Marc LaRochelle

**Project Team:** Shapei Yan (BMC)

**Project Aims:** Hospitals and emergency departments that implemented an addiction consult service or bridge clinic in communities randomized to the intervention (Wave 1) will have higher rates of post-discharge MOUD use compared to wait-listed hospitals (Wave 2) that later implemented an addiction consult service or bridge clinic.

## PHD Active & Completed Analytic Projects

### BCHAP. Characterization of DIA Workers Comp Claims by Race/Ethnicity and Other Demographic- and Employment-related factors using Multiple Datasets in the PHD

**Project Lead:** Elizabeth Erdman

**Project Team:** Kathleen Grattan (DPH), Dana Bernson (DPH), Emily Sparer-Fine (DPH), Leslie Boden (BU), Erika Sabbath (BC), Devan Hawkins (MCPHS), Cora Roelofs (UML), Kathleen Fitzsimmons (DPH)

**Project Aims:**

1a) What is the distribution (%) of race/Hispanic ethnicity and nativity status among injured workers with workers' comp claims in the PHD? Which worker group(s) have the highest rate "risk" of claims?

1b) How do these distributions/rates vary by industry and/or occupation? What industries and/or occupations experience the highest rates?

2a) What is the distribution (%) of workers' comp claims by sex, education, primary spoken language, veteran status, homeless status, incarceration status and disability status? Which worker group(s) have the highest rate "risk" of claims?

2b) How do these distributions/rates vary by industry and/or occupation? What industries and/or occupations experience the highest rates?

### Section 33

**Project Lead:** Christopher Massad (BSAS/OSE)

**Project Team:** Catherine Urquhart (BSAS), Jacob Freedman (BSAS), Kyler Groner (BSAS)

**Project Aims:** This analysis is intended to provide descriptive statistics of trends of mortality and morbidity from substance use among historically marginalized populations, which may potentially identify groups for which additional supports may be indicated.

### Growth and Decline in SNAP Generosity: Outcome and Equity Implications

**Project Lead:** Rajan Sonik

**Project Team:** Bianca Porneala (Brandeis), Natalie Moresco (Brandeis), Kimberley Nicholson (Brandeis), Maya Stantchev (Brandeis), Jayln Allen (Brandeis), William Crown (Brandeis), Monika Mitra (Brandeis), Benjamin Cook (Harvard), Michael Flores (Harvard), Akhil Reddy (Harvard), John Hsu (Harvard), Vicki Fung (Harvard)

**Project Aims:** The Supplemental Nutrition Assistance Program (SNAP) has been shown to reduce but not eliminate food insecurity, suggesting that enhanced levels of SNAP benefits may further reduce food insecurity and associated unfavorable healthcare outcomes, particularly among racial/ethnic minorities and people with disabilities, for whom these phenomena are disproportionately prevalent and impactful. While addressing concurrent pandemic and public policy-related changes, this project will exploit a staggered set of natural experiments created by the Families First Coronavirus Response Act (FFCRA) to examine the effects of SNAP benefits on healthcare outcomes and disparities by race/ethnicity and disability status.

### Unwinding pandemic-era social programs: Effects on healthcare outcomes and disparities

**Project Lead:** Rajan Sonik

**Project Team:** Bianca Porneala (Brandeis), Natalie Moresco (Brandeis), Kimberley Nicholson (Brandeis), Maya Stantchev (Brandeis), Jayln Allen (Brandeis), William Crown (Brandeis), Monika Mitra (Brandeis), Benjamin Cook (Harvard), Michael Flores (Harvard), Akhil Reddy (Harvard), John Hsu (Harvard), Vicki Fung (Harvard), Aisli Valencia (AltaMed)

**Project Aims:** This project will study the effects of the expiration of programs introduced in response to the COVID-19 Pandemic that increased social welfare generosity; in particular, it will leverage natural experiments created when increases to Supplemental Nutrition Assistance Program (SNAP) benefits were unwound, including unique ways in which this was done in Massachusetts. To strengthen causal understandings regarding relationships between social programs like SNAP and healthcare outcomes, this project will estimate the effects of SNAP unwinding on Medicaid event rates

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(preventive use, unfavorable event rates, and expenditures) and on disparities in these event rates by disability, race, and ethnicity.

### Comprehensive real-world evidence on off-label ketamine safety to inform regulatory and clinical decision making

**Project Lead:** Martin Wegman (American College of Emergency Physicians)

**Project Team:** Jonathan Fisher (American College of Emergency Physicians) , Gerard Sanacora (Yale School of Medicine), Boris Heifets (Stanford), Michela Stephens (Insights for Health)

**Project Aims:** This proposal aims to generate information on the safety and outcomes attributable to increasingly prevalent off-label medical and non-medical use of racemic ketamine. Specifically, we seek to leverage the PHD to examine the role of prescription ketamine (among initiators) on mortality and claims-based healthcare utilization outcomes relative to a similar comparison group.

### Interfacility Transfers of Birthing People in Massachusetts

**Project Lead:** Victoria Nielsen (MADPH), Muge Capan (UMass)

**Project Team:** Jessica Boakye (UMass)

**Project Aims:** The analysis will move in a hierarchical fashion, addressing each question in the following order:

1. Descriptive- How often to IFTs occur among birthing people? What are the demographic, social, and geographic characteristics of these patients? What are the facility characteristics where these IFTs tend to occur and are there any notable transfer patterns between facilities?
2. Outcomes
3. Prediction- Are there organizational, patient, or environmental characteristics that predict an IFT occurring? Can we develop a model to predict IFT probability?

# PHD Active & Completed Analytic Projects

## Completed Projects

### Assessing Opioid Use Disorder and Access to Drug Treatment among Pregnant Women in the U.S.: A Data-Driven Approach to Inform Equitable Public Health Responses

**Project Lead:** Thomas J. Stopka (Tufts)

**Project Team:** Chandni Joshi (Tufts), Kwan Ho Kenneth Chui (Tufts), Margie Skeer (Tufts), Andy Hui (Tufts)

**Project Aims:**

1. Assess disparities in OUD among pregnant people in MA through statistical and spatial epidemiological analyses.
  - 1a) Identify clusters of pregnant people with OUD in MA using GIS and spatial epidemiology.
  - 1b) Determine ZIP Code-level factors (social determinants of health) associated with these clusters through statistical modeling.
2. Assess spatial and nonspatial factors for MOUD access among pregnant people with OUD in MA.
  - 2a) Identify MA ZIP Codes with low capacity to deliver MOUD using GIS and spatial epidemiology.
  - 2b) Assess whether ZIP Code level access to MOUD varies with measures of geographic disparity (social determinants of health) through statistical modeling.

## Opioid Taper Analyses

**Project Lead:** Amy Bettano (DPH)

**Project Team:** Dana Bernson (PHD), Marc LaRochelle (BMC/BUSM), Len Young (DPH), Netrali Dalvi (DPH), Nassira Nicola (DPH)

**Project Aims:**

1. Do patients without evidence of OUD who are tapered from their long-term opioid therapy experience worse health outcomes and increased likelihood of death than those that are maintained on their long-term opioid therapy?
2. Do patients without evidence of OUD who are discontinued from their long-term opioid therapy experience worse health outcomes and increased likelihood of death than those that are maintained on their long-term opioid therapy?
3. Do patients without evidence of OUD who are discontinued from their long-term opioid therapy experience worse health outcomes and increased likelihood of death than those who are tapered from their long-term opioid therapy?

## Study of Criminal Prosecution of Pregnant and Postpartum People

**Project Lead:** Beth Buxton (BFHN)

**Project Team:** Rebecca Fauth (Tufts), Chie Kotake (Tufts), Devon Dunn (DPH), Darien Mather (DPH)

**Project Aims:**

- Using linkages between MOM birth and fetal death records and DOC data to identify the prevalence of females with deliveries while incarcerated, within a year prior to incarceration, and within 40 weeks following release. We will stratify these data by mothers' race and ethnicity, as well the status of the person (pretrial, criminal, civil) to



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understand how many people are incarcerated for criminal matters. Stratifying data in these ways will give some indication of structural inequities in Massachusetts. Given limited access to healthcare and disruptions to parent-infant attachment while parents are behind the wall, among other challenges, understanding the prevalence of pregnant or postpartum people who are incarcerated can inform needed interventions as well as alternatives to incarceration for this vulnerable population.

### (OD2A) Overdose to Action

**Project Lead:** Elizabeth Erdman

**Project Team:** Kathleen Grattan (DPH), Dana Bernson (DPH), Emily Sparer-Fine (DPH), Leslie Boden (BU), Erika Sabbath (BC), Letitia Davis, Devan Hawkins (MCPHS), Cora Roelofs (UML), Kathleen Fitzsimmons (DPH)

**Project Aims:**

1. What is the risk of fatal and nonfatal overdose among injured workers, and how does work-related injury serve as potential gateway to opioid use?
2. What is the prevalence of OUD 2016-2019 and how does it vary by population?
3. What is the relationship between prescribing history and postmortem toxicology for all drug deaths?

### Impact of health insurance type and transitions on treatment for opioid use disorder

**Project Lead:** Marc LaRochelle (BMC/BUSM)

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**Project Team:** Shapei Yan (BMC), Jake Morgan (BUSPH), Alex Walley (BMC/BUSM), Ben Linas (BMC/BUSM), Dana Bernson (MDPH), Avik Chatterjee (BMC), Radhika Puppala (BMC), Paul Christine (CUAnschutz)

**Project Aims:**

1. Objective 1: Compare medication for opioid use disorder (MOUD) initiation, engagement and retention by insurance type.
2. Objective 2: Identify the impact of health insurance transitions on MOUD initiation, engagement and retention.

### Utilization of MOUD before and after incarceration and the impact on post-release outcomes

**Project lead:** Ben Bovell-Ammon (Miriam Hospital/Lifespan/BMC)

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**Project team:** Marc LaRochelle (BMC/BUSM), Shapei Yan (BMC), Alex Walley (BMC/BUSM), Dana Bernson (DPH), Sara Lodi (BUSPH), Peter Friedmann (Baystate health), Elizabeth Evans (Umass)

**Project Aims:**

1. Describe MOUD utilization before and after incarceration (i.e. across the CLS continuum), including during parole, in a cohort of Massachusetts residents.
  - a. overall, stratified by race-ethnicity, and by co-occurring serious mental illness
  - b. describe time-trends 2011-2019
2. Among individuals with OUD who are recently released from incarceration, evaluate the impact of MOUD on fatal and non-fatal overdose and reincarceration.
  - a. overall, stratified by race-ethnicity, by co-occurring mental illness
  - b. stratified by parole status

# PHD Active & Completed Analytic Projects

## HEALing Communities Study (HCS) Plan 1 & 2

**Project Lead:** Jeffrey Samet

**Project Team:** Josh Barocas (BU/BUSM), Jenny Wang (BU/BUSM), Juliet Flam-Ross (BMC), Pallavi Aytha Swathi (CUAnschutz), Paul Christine (CUAnschutz)

### HCS Analytic Plan 1 Project Aims:

1. What is the prevalence of the population with opioid use disorder (OUD) in Massachusetts?
2. What are the geographic patterns and population characteristics of people with OUD?
3. How has the prevalence of OUD changed over time?
4. What are potential biases in capture-recapture methods due to systematic misclassification or miscoding?

### HCS Analytic Plan 2 Project Aims:

1. To estimate the prevalence of stimulant misuse and/or use disorder (SM/SUD) by year in Massachusetts stratified by vulnerable populations. We hypothesize that the prevalence of SM/SUD is under-estimated by the National Survey on Drug Use and Health.

## Improving adherence to and outcomes associated with Medication Assisted Treatment (MAT)

**Project Lead:** Leonard Young (MDPH)

**Project Team:** Gary Young (Northeastern), Noor Alam (Northeastern), Md. Hasan (U of Florida at Gainesville), Tianjie Zhu (Northeastern), Netrali Dalvi (MDPH), Danielle Valerio (MDPH), David Johnson (MDPH), James Lavery (MDPH), Tianjie Zhu (Northeastern)

### Project Aims:

- Objective 1: Assess degree of variation in treatment adherence and patient outcomes in connection to buprenorphine treatment among patients, prescribers, and treatment settings in Massachusetts. Is there a high degree of variation and, if so, does it appear that some prescribers and treatment facilities achieve much better adherence/outcomes than others? How much of the variation in adherence/outcomes appears to be attributable to patients vs. prescribers vs. treatment settings? We will also identify patients who switched from buprenorphine to methadone treatment and examine the costs of care (based on fully adjudicated claims – versioning indicator) for patients undergoing buprenorphine treatment who have hospitalizations and ER visits.
- Objective 2: Examine characteristics of patients, prescribers, and treatment settings that appear to be associated with better treatment adherence and related patient outcomes in connection with buprenorphine treatment for OUD.
- Objective 3: Based on study results, identify a set of recommendations and potential best practices for improving the clinical management of patients undergoing buprenorphine treatment for OUD.

## Development of novel risk prediction models for opioid use and overdose among vulnerable populations

**Project Lead:** Joshua Barocas (BMC/BUSM)

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**Project Team:** Prasad Patil (BUSPH), Laura White (BUSPH), Jenny Wang (BUSPH), Kristina Yamkovoy (CU Anschutz), Pallavi Aytha Swathi (CU Anschutz)

### Project Aims:

3. The aims of the risk prediction arm of this project are:

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- a. To develop and validate an opioid misuse and an overdose risk prediction model with expert opinion-derived variables from the PHD to identify potential persons for early intervention to prevent opioid misuse and overdose.
- b. To develop and validate an opioid misuse and overdose risk prediction model with community-derived variables (see concept-mapping below) from the PHD to identify potential persons for early intervention to prevent opioid misuse and overdose.
- c. To compare the predictive power of the models.

### Assessing Individual and Structural Factors Associated with Opioid Mortality among Recently Incarcerated Individuals in Massachusetts

**Project Lead:** Meredith Rosenthal (HSPH)

**Project Team:** Benjamin Barsky (Harvard)

**Project Aims:**

1. Understand prevalence of opioid use issues among individuals with histories of incarceration in Massachusetts (MA).
2. Assess patterns of fatal opioid overdoses (FOOs) among recently incarcerated individuals in MA.
3. Examine whether individual characteristics (e.g., length of incarceration, socioeconomic status, comorbidities) are associated with frequency of FOOs upon release.
4. Analyze whether access to care post-release (e.g., hospital visits, medication for opioid use disorder prescriptions, targeted substance use treatment program) is associated with FOOs.
5. Capture through spatial analysis whether a positive relationship exists between FOO and COVID-19 rates, which would suggest that places with higher COVID-19 rates lack the services and infrastructure necessary to curb other public health concerns like FOOs.

### Retention and Re-Engagement in Treatment for Addiction following Serious Injection Related Infections (RETAIN)

**Project Lead:** Simeon Kimmel (BUSM/BMC)

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**Project Team:** Marc LaRochelle (BUSM/BMC), Alex Walley (BUSM/BMC), Jeffrey Samet (BUSM/BMC), Laura White (BUSPH), Shapei Yan (BMC), Michael Stein (BUSPH), Adam Majeski (BMC), Weihsuan Jenny Lo-Ciganic (UFL)

**Project Aims:**

1. Examine MOUD treatment along the OUD care continuum in the 12 months after a SIRI. I will examine a unique, Massachusetts Public Health dataset (PHD) which links individual-level claims, substance use treatment, and vital records to describe MOUD treatment following SIRIs using analytic models that account for 1) recurrent events (repeated treatment episodes) and 2) hypothesized latent class membership (e.g. early or late discontinuers, intermittent engagers, long term retainers) to inform intervention development. The results from Aim 1 will be used in Aim 2 and Aim 3.
2. Adapt Recovery Management Checkups, an MOUD retention intervention, for individuals with SIRIs.
3. Conduct a pilot randomized controlled trial of Recovery Management Checkups to promote MOUD retention and re-engagement for individuals with SIRIs.

### The Care Continuum for Youth with Substance Use Disorders

**Project Lead:** Scott Hadland (BMC/BUSM)

## PHD Active & Completed Analytic Projects

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**Project Team:** Sarah Bagley (BMC/BUSM), Marc LaRochelle (BMC/BUSM), Heather Hsu (BMC/BUSM), Shapei Yan (BMC), Weihsuan Jenny Lo-Ciganic (UFL), Connor Buchholz (MGH)

### Project Aims:

1. Using a look-back approach, identify preceding diagnoses and interactions with the healthcare system and state services (and the timing of these) among youth who develop a diagnosis of opioid use disorder.
2. Using a look-forward approach, determine what percentage of youth diagnosed with an opioid use disorder receive timely treatment (i.e., behavioral health services and/or medications for opioid use disorder within one month of diagnosis), for how long, and whether such treatment prevents intensification of their opioid use disorder (i.e., prevents further complications such as overdose or injection-related harm).  
Identify sex-and race-specific factors associated with the development of opioid use disorder among youth and access to treatment and other services.

## Examining Racial/Ethnic Disparities in Opioid Treatment

**Project Lead:** Michael William Flores (HERL, CHA/HMS)

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**Project Team:** Benjamin Lê Cook (HERL, CHA/HMS), Amanda Sharp (HERL, CHA/HMS), Brian Mullin (CHA), Rajendra Aldis (CHA)

### Project Aims:

1. To estimate racial/ethnic trends in opioid use disorder (OUD), medications to treat OUD (MOUD), MOUD initiation, MOUD retention, and fatal/non-fatal opioid-related overdose.  
**Hypothesis 1a.** Rates of OUD, MOUD initiation, MOUD retention, and fatal/non-fatal opioid-related overdose for White, Black, and Latinx will increase overtime.  
**Hypothesis 1b.** Black-White and Latinx-White disparities in MOUD initiation and retention will not change overtime.
2. To estimate racial/ethnic differences in MOUD availability and time to MOUD prescription  
**Hypothesis 2a.** Zip codes with higher proportion of Black and Latinx residents will have fewer providers prescribing buprenorphine than zip codes with lower proportion of Black and Latinx residents.  
**Hypothesis 2b.** Relative to Whites, Black and Latinx will experience greater time to MOUD following a non-fatal overdose.

## MATADOHR - Massachusetts Tackling Addiction Determinants Of Health through Research

**Project Lead:** Amanda Latimore (AIR)

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**Project Team:** Taletha Derrington (AIR), Brandy Farrar (AIR), Brett Kellett (AIR), Madeline Polese (AIR), Kevin Schott (AIR), Maura Shramko (AIR), Angshuman Gooptu (AIR), Yibing Li (AIR), Peter Coyne (AIR), Rosie Mae Henson (AIR), Mikah Jones (AIR), Joe Miller (AIR)

### Project Aims:

Research exists to support the linkages between the social determinants of health and overdose, but studies are often limited to one social determinant and are either individual-level or community-level analyses but not both. The goal of the proposed research is to identify a sample of Massachusetts residents at high risk for overdose and assess the race/ethnicity-specific association of individual-and community-level social determinants (i.e., housing, employment, education, access to healthcare, criminal-legal involvement, and social supports) and overdose death among people at high risk for opioid overdose (as determined by any substance use disorder (SUD)-related event) between 2011 and 2019. This goal will be accomplished through the following aims:

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1. Access to care
  - a. 1.1. Assess the race/ethnicity-specific association between overdose death and “access to care,” where “access to care” is (a) individual access to medical and behavioral health services (behavioral health coverage, type of medical coverage) at the time of the SUD-related event and (b) county-level access (Office of Inspector General buprenorphine capacity report, Health Professional Shortage Area).
  - b. 1.2. Assess the interaction of “access to care” and receipt of medications for opioid use disorder (MOUD) for their association with opioid overdose death.
2. Housing and homelessness
  - a. 2.1. Assess the race/ethnicity-specific association between overdose death and “housing and homelessness,” where “housing and homelessness” is (a) the individual-level experience of homelessness at the time of SUD-related event(s) and (b) housing cost burden.
  - b. 2.2. Assess the interaction of “housing and homelessness” and receipt of MOUD for their association with opioid-related overdose death.
3. Food Insecurity
  - a. 3.1. Assess the race/ethnicity-specific association between overdose death and “food insecurity,” where “food insecurity” is (a) individual Supplemental Nutrition Assistance Program (SNAP)/Women, Infants, and Children receipt at the time of SUD-related event(s) and (b) county-level percentage of households with SNAP benefits.
  - b. 3.2. Assess the interaction of “food insecurity” and receipt of MOUD for their association with opioid-related overdose death.
4. Criminal legal exposure
  - a. 4.1. Assess the race/ethnicity-specific association between overdose death and “criminal legal exposure,” where “criminal legal exposure” is (a) days incarcerated and (b) county-level incarceration rates.
  - b. 4.2. Assess the interaction of “criminal legal exposure” and the receipt of MOUD for their association with opioid overdose death.
5. Socioeconomic Status
  - a. 5.1. Assess the race/ethnicity-specific association between overdose death and “socioeconomic status,” where “socioeconomic” is (a) individual unemployment and education level during the period of observation and (b) county-level unemployment and education.
  - b. 5.2. Assess the interaction of individual-level receipt of MOUD on individual- and county-level “socioeconomic status” for their association with opioid overdose death.
6. Social and community support
  - a. 6.1. Assess the race/ethnicity-specific association between overdose death and “social and community support,” where “social and community support” is (a) individual-level receipt of peer specialist or recovery support services, as well as county-level (b) social capital (Rupasingha et al., 2006; Zoorob & Salemi, 2017) and (c) social vulnerability index.
  - b. 6.2. Assess the interaction between individual-level receipt of MOUD and “social and community support” for their association with opioid overdose death.
7. Relative contributions of individual and county factors to overdose
  - a. 7.1. Within race/ethnicity-specific subsamples, assess the percentage of variance in overdose deaths contributed across (a) all individual-level characteristics (including age, gender, and receipt of MOUD) and (b) all county-level characteristics.

## HIV and Hepatitis C prevalence and risk factors among the population of persons who use drugs in Massachusetts

**Project Lead:** Joshua Barocas (BMC/BUSM)

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## PHD Active & Completed Analytic Projects

**Project Team:** Prasad Patil (BUSPH), Laura White (BUSPH), Jenny Wang (BUSPH), Kristina Yamkovoy (CU Anschutz), Yanjia Zhang (BUSPH), Pallavi Aytha Swathi (CU Anschutz), Cole Jurecka (CU Anschutz), Samantha Sills (CU Anschutz), Pranav Padmanabhan (CU Anschutz)

### Project Aims:

1. The aims of the risk prediction arm of this project are:
  - a. To develop and validate prediction models with expert opinion-derived variables from the PHD to identify potential persons for early intervention to prevent HIV acquisition, disease progression, and loss to follow up.
  - b. To develop and validate prediction models with community-derived variables (see concept-mapping below) from the PHD to identify potential persons for early intervention to prevent HIV acquisition, disease progression, and loss to follow up.
  - c. To compare the predictive power of the models.
2. The aims of the prevalence estimation arm of this project are:
  - a. To use previously developed indirect estimation methods including capture-recapture and Bayesian multiplier methods to estimate the prevalence of HIV among the population of people who use drugs, justice-involved individuals, persons experiencing homelessness, and other high priority populations.
  - b. To use previously developed indirect estimation methods including capture-recapture and Bayesian multiplier methods to estimate the prevalence of hepatitis C among the population of people who use drugs, justice-involved individuals, persons experiencing homelessness, and other high priority populations