Supplemental Online Content

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Supplement 1. eAppendix

This supplemental material has been provided by the authors to give readers additional information about their work.

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Introduction

The analyses reported in the main manuscript use the Reducing Infections Related to Drug Use Cost Effectiveness (REDUCE) Model of acquisition and treatment for bacterial infections and overdose associated with injection drug use. The original model has been adapted to specifically model the population in the U.S. experiencing unsheltered homelessness. The REDUCE model tracks several clinical outcomes including number of people with infective endocarditis (IE), severe skin and soft tissue infections (SSTIs), and overdose (OD) (otherwise known as 'sequelae'), number of cases identified, number linked to inpatient and outpatient care, number of people initiating antibiotic therapy and mediations for opioid use disorder (MOUD), and number achieving cure from their sequelae of drug use. The model also tracks sequelae-related mortality and undiscounted and discounted life expectancy. This technical appendix provides details on key features of the model and modeling approach used for this analysis. We constructed the model and performed analyses using C++ and R (3.2.2). The model has been previously described in the peer-reviewed literature.[1-3] The model is available for review upon discussion with the authors and as resources are available. We did not use every component of the model for the current analysis. In addition, we provide figures and several tables detailing input parameter values and additional results cited in the manuscript.

REDUCE Model

The REDUCE model is an individual-based, stochastic simulation model of the natural history of injection drug use designed to estimate the outcomes and, in some cases, costs associated with various strategies of prevention, treatment, and improving drug use-related care. The model uses a cycle length of one week.

Overview

The model is designed as a number of modules through which simulated individuals pass. Briefly, a cohort module helps to "create" the population of interest. Next, individuals created during cohort generation enter the "sequelae of drug use (SDU)" module, which is where they encounter probabilities of fatal or nonfatal overdose, infective endocarditis, or skin and soft tissue infections. From the SDU module, individuals enter back into the simulation or link to the "inpatient" module. In the "inpatient" module, individuals are hospitalized for their SDU. There are a variety of interventions (beyond standard hospital treatment) that individuals may encounter if those services are turned "on" by the user. Following the inpatient module, individuals have a probability of linking to outpatient care in the "outpatient" module. Linkage to outpatient care may vary based on the type of services an individual encountered in the hospital and/or the type of SDU they have (overdose vs infection). They may unlink from the outpatient module or never enter it (based on probabilities). The "behavioral transitions" module is when individuals have the probability of moving between injection frequency drug use states (high frequency, low frequency, or no current drug use), between sterile injection practice states (skin cleaning or no skin cleaning), and sharing/reusing needles. After the "behavioral transitions" module, individuals move to the "mortality, cost, and quality of life" module. At this point, the model begins again in cycle n+1.

Cohort Initiation

When the model is initiated, a cohort of individuals is generated using 6 parameters:

(1) ever injection drug use status (ever/never)
(2) age (18-99)
(3) sex (M/F)
(4) injection frequency (high/low/no current/never)
(5) reusing/sharing equipment (yes/no/never).
(6) sterile injection practice (cleaning/no cleaning/never)

From these parameters, the initializing cohort includes people who have "ever" or "never" injected drugs. Those who are "ever" injectors are stratified by injection frequency and injection practices. The model is structured such that first the user specifies the proportion of the population that has ever injected drugs. Following that, there are two methods by which the model can draw age and sex. The first is by using age/sex tables and the second is by directly specifying age and sex distribution parameters. In the latter method of drawing from age and sex, the user inputs

values directly into the deterministic parameter file. These inputs include proportion male, average male age, standard deviation male age, average female age, standard deviation female age, and minimum age.

Next, among those who are ever drug users, the probability of injection frequency is drawn from an age/sex stratified table—high, low, and no current injection drug use. Within the literature, injection frequency is usually reported as summary of behavior within the past month and while frequency may change daily depending on drug availability, we assume that overall frequency is stable over a one-week period. For generating the frequency of injection, all three probabilities for an age/sex group equals 1 and the model draws from this set of probabilities. Finally, all persons who are "ever" drug users, are assigned an initial status of being a skin cleaner and a needle sharer which does not depend on age and gender. While these are the initial attributes, all individuals have the possibility of changing attributes as they move through the model. All never drug users are assigned "never" injection frequency, skin cleaning and needle sharing status.

Assumptions built into the model for the initial cohort:

1) no one starts on treatment for opioid use disorder
2) no one starts out with a history of overdose
3) no one starts with a history of infection
4) no one begins in care or in the hospital setting.

For the present analysis, we initialized 23 different cohorts utilizing city specific-data from the National HIV Behavioral Surveillance (NHBS). Each cohort included characteristics of people experiencing homelessness who inject drugs in that that particular city. Characteristics for each city are presented in **Supplemental Table S27.** For characteristics that were not available using NHBS, we used U.S. Census data and/or published literature.

Sequelae of Drug Use

Once the cohort is initialized and each individual has been assigned an initial drug use status, age, sex, and injection frequency and practices, individuals enter the sequelae of drug use (SDU) module. Broadly, the SDU in this model include infective endocarditis (IE) and overdose (OD). When they first enter, the model checks their ever/never status. If they are "never," then they return to the simulation. Therefore, only "ever" drug users can progress through this module. The model then checks their injection frequency. If they are "no current," then they return to the simulation. Therefore, only "low frequency" and "high frequency" injectors progress through this module. Additionally, if the individual is currently in inpatient care, they return to the simulation. If a person is currently on antibiotics, they progress through the SDU module but they cannot acquire a new infection (IE).

At this point, remaining individuals are subject to probabilities for acquiring an SDU. On the first cycle of this model, no one has a history of SDU, but have the possibility of acquiring one or multiple through their life. History of SDU is tracked as it has implications for future SDU. One assumption of the model is that SDUs can only be acquired while not "inpatient" or on antibiotics (next module).

Individuals who are eligible for an SDU, progress through a number of probabilities of acquiring an SDU. All SDUs are stratified by injection frequency (high and low) and the infectious SDU are also stratified by injection practices (skin cleaning, needle sharing). SDU probabilities are not stratified by age and sex. The model is structured such that an individual first encounters a combined probability of overdose (fatal + nonfatal), stratified by injection frequency. If an individual has a current infection their overdose rate is multiplied by the current infection multiplier. A proportion of overdoses are fatal and a proportion are nonfatal. One aspect of the model is that at this point, if a person draws a fatal overdose then they are flagged as "dead, fatal overdose." They continue to proceed through the rest of the modules but cannot acquire any further attributes (e.g., they cannot get another infection, be hospitalized, start MOUDs, change their behaviors). These individuals, however, accrue the full costs of the cycle (based on background costs, costs of fatal overdose, and costs of any other SDUs that are untreated) and utilities (based on age, sex, and other current health states at the end of the cycle). For those that have a nonfatal overdose or do not have an overdose, they then face a combined probability of IE and SSTI, stratified by injection frequency, skin cleaning and needle sharing attributes. The model is structured to account for a history of SDU (treated in hospital,

resolved because it was a nonfatal OD) and for existing SDUs. An existing SDU is anything that an individual has during the current cycle. From a clinical perspective, this represents an "untreated" infection (e.g., someone has not gone to the hospital for their endocarditis or SSTI or someone is currently on outpatient antibiotics but not cured) or a current nonfatal overdose. Once treatment is complete or the SDU resolves (as is the case with nonfatal overdose which resolves in 1 cycle), then the person is flagged with a history of the corresponding SDU.

An existing SDU causes a change in the likelihood of another SDU. In the model, there is a single multiplier for one or more existing SDUs that is applied to both the probability of OD and the probability of infectious SDU. This multiplier exists until the individual is treated for the SDU. For those who have a nonfatal overdose, the existing SDU multiplier will be applied to the probability of infection in the same cycle only since an existing nonfatal OD (that does not link to inpatient), only lasts one cycle. Additionally, a history of SDUs changes the probability of future SDUs. Multipliers are only applied to the SDU for which there is a history (e.g., OD history changes the probability of recurrent OD; any infection history changes the probability of future infection [any infection, not just the one that occurred]). For OD, there are 4 multipliers (e.g., 1 past nonfatal OD, 2-3 past nonfatal OD, 4-7 past nonfatal OD, and 8+ past nonfatal ODs). For history of treated infections, there is only one multiplier (1+ past treated infections). For instance, in cycle 1, an individual gets IE but does not go to the hospital/receive treatment and does not die in cycle 1. By cycle 2, having IE makes that individual have a greater probability of OD. For this model, individuals will not be able to acquire the same SDU in that next cycle. From the previous example, the individual with IE will only be able to acquire OD, not IE in cycle 2. While that infection remains untreated, there is an effect on getting another infection/OD. Once that infection is treated, then there is a separate effect of this infection on future infections. Therefore, this module has two multipliers: 1) one that can change the probability of an additional SDU if current SDU is untreated, and 2) one that can change the probability of a recurrent SDU (in the future) if the current SDU is fully treated and they survive it.

If an individual does not acquire an SDU in the current cycle and does not have an untreated SDU from a past cycle, they return to the simulation. If they acquire one or more SDUs, or have an untreated SDU from a past cycle, then individuals draw linkage probability to inpatient from the SDU. Linkage to inpatient depends on the linkage probability of their SDU; if an individual has more than one SDU, their linkage probability is the highest of the linkage probabilities for the SDUs they have. There remains the possibility that an individual does not link to inpatient. In the case of nonfatal OD, it implies that the OD was not severe enough to require hospitalization (or was treated in the field). In the subsequent cycle, there should not be a flag for untreated overdose. All nonfatal overdoses are, by definition, treated so the "existing" state can only last for the cycle in which the non-fatal overdose occurs. In the case of endocarditis, the untreated flag should remain on until the person either dies or links to inpatient care and gets cured. This is because endocarditis is generally uniformly fatal if untreated. Individuals who go to the hospital will be classified as "inpatient" starting in the same cycle and will have an "in-hospital mortality." Once they leave the hospital, they are considered as having a history of infection. If an individual does not link to inpatient, they are classified as having "existing" SDU and have different risks of death (untreated mortality probabilities for each SDU). Individuals who come to the SDU module on subsequent cycles with an additional SDU (>1 SDU at a time) will have the probability of hospitalization that is equal to the highest probability of the SDUs.

Attributes that an individual can acquire in this module and are tracked:

1. Current IE
2. Current OD, non-fatal
3. Current OD, fatal
4. History of treated IE
5. History of treated OD

eTable 1. Weekly probability of developing infective endocarditis, stratified by injection behavior profile.

Injection behavior profile	Value (mean, standard deviation)
High frequency, no skin cleaning, no needle sharing	0.0045 (0.067)
High frequency, skin cleaning, no needle sharing	0.0004 (0.020)

High frequency, skin cleaning, needle sharing	0.0023 (0.048)
High frequency, no skin cleaning, no needle sharing	0.0008 (0.028)
Low frequency, no skin cleaning, needle sharing	0.0023 (0.048)
Low frequency, skin cleaning, no needle sharing	0.0002 (0.014)
Low frequency, skin cleaning, needle sharing	0.0011 (0.034)
Low frequency, no skin cleaning, no needle sharing	0.0004 (0.020)

Inpatient Hospitalization

One assumption of the model is that any individual that has either a) current injection drug use or b) a current, untreated SDU is presumed to have opioid use disorder (OUD). Some sequelae of OUD are infectious and some are non-infectious (e.g., overdose).

Each individual with 1+ SDU has a probability per cycle of presenting to an inpatient setting for their care. When individuals enter the inpatient module, the model checks their current SDU status. If they do not have a current untreated SDU or died of fatal overdose in the previous module, or they are on outpatient antibiotics, then they return to the simulation. Therefore, only those individuals with active SDU can progress through this module.

The path through the inpatient module is conditional on the SDU(s) that an individual has: nonfatal OD, IE, SSTI or combination. The hospitalization duration for overdose is 1 cycle; the hospitalization duration for IE is drawn stochastically from a normal distribution with a user defined mean and standard deviation; the model allows for a maximum hospitalization to be set so that at the end of the max amount of time a person will leave the hospital. The key feature of this module is that individuals may encounter a variety of in hospital services. These services are either turned on or off by the user depending on the analysis. If they are on, then individuals will have a probability of being offered and of accepting those services during their hospitalization. Each service has an effect either within this module or elsewhere in the simulation. These interventions are applied only in the last cycle of hospitalization and they will have post-treatment effective cycles drawn from a normal distribution. Individuals should be "marked" as using/receiving a service such that the cost can be tabulated in the separate module. For the current simulation, none of the hospital-based services were turned "on" though patients could continue on MOUD if they entered the model on a medication, but could not newly initiate.

Each individual has a probability of in-hospital mortality that is discussed in detail in the mortality section. It is mentioned here to note that it is an attribute that an individual can acquire. During hospitalization, individuals "carry" a flag/marker that designates them as hospitalized. While hospitalized, individuals cannot get a new SDU so they will not enter SDU module. They have an "in hospital" mortality that is conditional on the SDU for which they are hospitalized. For the duration of their hospitalization, their injection frequency is considered to be "no current" regardless of their actual status and they are not exposed to behavior transitions. The exception to this rule is as follows: in the last hospitalization cycle, individuals are exposed to behavior transitions based on their pre-hospitalization status. If they have received any intervention that would affect their behaviors (MOUD), the intervention effect will be applied to their actual or pre-hospitalization behaviors and post-treatment effective cycles will be drawn. These behavioral changes are assigned in the last inpatient cycle so that they take effect the first cycle out of inpatient. However, cost-life-mortality module still consider them as "no current". We assume, in the base case, that 5% of patients leave against medical advice (AMA) per week or as a patient-directed discharge prior to completion of treatment, informed by published studies reporting a high rate of AMA within this patient population.[4,5] When the inpatient hospitalization time has lapsed or patients leave against medical advice, individuals move to the outpatient module. In the outpatient module, they have a probability of then linking to different types of care.

Outpatient care

There are two different ways by which an individual can enter the outpatient module. First, an individual can enter via background linkage. This means that those who are not hospitalized but "decide" to seek care can do so by entering this module. Second, an individual can enter via the inpatient module.

For individuals entering from the simulation (background). Each individual encounters the outpatient module. Individuals with a "death" flag from a previous module (fatal overdose) enter the outpatient module and immediately return to the simulation. Individuals who are currently hospitalized immediately return to the simulation. All other "ever" drug user individuals have a probability of linking to outpatient care and progress through the outpatient module, regardless of history of SDU or drug use status. If individuals do not draw "linkage" then they return to the simulation.

For individuals entering from the inpatient module (inpatient linkage). When the inpatient hospitalization time has lapsed, then individuals encounter a linkage probability to the outpatient module depending on inpatient services they have received.

Outpatient addiction care. Individuals have a probability of linking to outpatient addiction care (either with or without MOUDs). One cannot be simultaneously in outpatient addiction care with MOUDs and without MOUDs (these are separate states). But individuals can be simultaneously in outpatient addiction care (with or without MOUDs) and outpatient antibiotics.

Individuals have a probability of unlinking from outpatient addiction care either with or without MOUDs or transitioning between MOUD states. There is a separate probability of linking to outpatient addiction care (with or without MOUDs) for those coming from the inpatient module and those coming from the simulation (spontaneous linkage/background linkage).

If an individual is in outpatient addiction care and acquires an infection they will automatically be linked to inpatient care in the next cycle. In this case, they will unlink from outpatient care and all outpatient related flags/cycles will be cleared.

eTable 2. Outpatient addiction services.

Outpatient service	**Eligibility**	**Effect in the model, while linked**
Outpatient addiction with MOUD	Any ever IDU in the simulation not actively hospitalized	Decreases probability of unclean injection; decreases needle sharing, increases probability of moving to lower frequency state and decreases probability of moving out of no/low frequency state.
Outpatient addiction without MOUD	Any ever IDU individual in the simulation not actively hospitalized	Decreases probability of unclean injection; decreases needle sharing.

Behavioral Transitions

Following the inpatient and outpatient modules, individuals move to the behavioral transitions module. Individuals may also enter this module "from the simulation." The latter represents the ability of someone to change their behaviors organically (without interventions). This is the module in which they can move between high frequency, low frequency, and no current use states, move from never and ever IDU, move between skin cleaning and not skin cleaning states, and move between sharing needles and not sharing needles states. There is a prior probability of movement between states (status quo) and various "flags" acquired throughout the model progression that impact certain probabilities. These have been outlined in various other module descriptions but are also be outlined below.

Treatment Effects: The primary driver of morbidity and mortality in the module is the injection frequency. High frequency individuals are at higher risk than low frequency injectors of sequelae of drug use (SDUs), which include overdose, skin/soft tissue infections, and endocarditis in this model. All persons who are "ever" injectors have the possibility of moving to a higher or lower injection frequency state (depending on their current state) or staying in

their current state per cycle. For instance, a high frequency injector may remain as a high frequency injector or may move to low frequency or no current use states. There are a few ways that the injection frequency can be modified in the model.

Mechanisms by which transitions between injection frequency states are changed:

1) Hospitalization.
2) Outpatient MOUD initiation.
3) Behavioral transitions with MOUD.

Mortality

There are two places in the model that an individual can die: fatal overdoses in the SDU module and in the mortality module. To review, in the SDU module, an individual draws a combined probability of all types overdose which is stratified by injection frequency (high and low frequency). From that combined probability, an individual can draw either a fatal or non-fatal overdose. If an individual draws a fatal overdose, they go through the remainder of the cycle with a "fatal OD" flag up which does not allow them to get any further interventions, collect additional costs, change their behavior status, etc., however, they will accumulate the background cost and utility of that cycle. As such, the background mortality in the mortality module should exclude overdose mortality.

The background mortality risk is an age and sex adjusted mortality probability (excluding fatal overdose). There are a number of occurrences in the model that can impact the weekly risk of mortality. First, individuals who are hospitalized for an SDU (non-fatal overdose or endocarditis) have an increased risk of death. If the inpatient individual receives an ID consult, their infection inpatient mortality rate is augmented by an ID consult mortality multiplier (ID consult will not affect overdose mortality). Second, individuals who have an untreated skin and soft tissue infection or untreated infective endocarditis have an increased risk of death. These risks are input as probabilities (and converted to rates by the model) which are then *added* to the background mortality at the end of each cycle. Once a patient is cured of their infection, their SDU flags are removed and their mortality goes back to background mortality. The mortality risk only applies for each cycle that they have that risk. For example, a person gets endocarditis and does not present to inpatient care during a cycle. Then they have an "existing endocarditis" flag that the end of the cycle should prompt the rate of death for untreated endocarditis to be added to the background mortality. On cycles 2-5 that same individual, however, is hospitalized and being treated for their endocarditis. For those cycles, they get an "in-hospital for endocarditis" flag such that the in-hospital endocarditis mortality rate is added to their background mortality each cycle. On cycle 6, this person leaves the inpatient setting (completes treatment) so all flags are, therefore, off and at the end of that cycle they get only background mortality. We do not include an additional mortality risk for being an active drug user since most of that risk will be folded into overdose and other SDUs.

Cause of death as an output: In the model, individuals can die of background causes or as a direct result of their injection drug use. Direct causes of injection drug use include:

1. Overdose (combination of fatal overdose/ hospitalized and nonfatal OD that dies in the hospital)
2. Endocarditis (combination of hospitalized and non-hospitalized)
3. Severe SSTIs

Aside from fatal overdose, all of the other causes of death get added to the background mortality as outlined above. For instance, an individual's weekly probability of death (conditional on not dying of a fatal overdose) may be p_d and they may have endocarditis which increases their risk of death by x. The individual's weekly risk of death is, therefore, *the sum of the rates converted to a probability.* However, as an output, we need to be able to determine the attributable cause of death (this person may have died of endocarditis OR background causes). To do this, we use the sum of the rates as the denominator and the individual mortality risk (rates) as the numerator in drawing the cause of death. Important for consistency, the input parameters are probabilities and therefore all rates are calculated in the model.

Impact of displacement on health behaviors and access

Data from two U.S. cities (Los Angeles and San Francisco), sponsored by the University of Southern California, was utilized to estimate the short-term impact of continual displacement on health behaviors and service access. To adjust for displacement between the status quo and continual displacement scenario, overdose risk, receptive needle sharing, and MOUD initiation were transformed using adjusted odds ratios (aOR) from the CTC. Focusing on participants who were displaced in the past 30 days, the aORs for the respective variables are as follows: 2.50 (1.28–4.90), 2.26 (1.18–4.32), and 0.62 (0.42–0.89). The modification of the three inputs between the status quo and continual displacement strategy include first converting the baseline weekly probabilities to a weekly rate [-LN(1-x)], multiplying that rate by the aOR, then converting that rate back into a weekly probability [1-e^(-x)]. Both overdose risk and MOUD initiation of the inputs are city-specific so they differ across all 23 cities. However, receptive syringe sharing is consistent across all cities and changes from a 0.02787 weekly probability in the status quo to a 0.059984 weekly probability in the continual displacement strategy using the aforementioned aOR of 2.26.

eTable 3. Impact of displacement on health behaviors and access

Parameter	Value, range	Source
Probability of Overdose (low frequency drug use & high frequency drug use)	2.50 (1.28–4.90)	[6]
MOUD Acceptance	0.62 (0.42–0.89)	[6]
Needle Sharing Probability	2.26 (1.18–4.32)	[6]

Calibration targets

The four clinically relevant calibration targets that each of the 23 U.S. cities were adjusted to are as follows:

1. Percentage of all deaths attributable to fatal overdose among PWID/PEH (national estimate)
    a. Range: 25-33%
2. 1-year nonfatal overdose among PWID/PEH (city-specific estimate)
    a. City-specific percentage
3. Remaining life expectancy among PWID/PEH (national estimate)
    a. Range: 50-59 years
4. Percent of people retained on MOUD after 6-months (national estimate)
    a. Range 18-30%

These parameters have either been provided by the NHBS data or have been calculated from the available literature. We aimed to be within 15% error for each of the targets. In order to get to these targets, small changes were made to various inputs in the model that were known to affect each target. For example, to hit the 1-year nonfatal overdose among PWID/PEH, the fatal overdose prevalence was either increased or decreased and the nonfatal overdose prevalence was either increased or decreased. We continued to tweak these inputs, within the ranges that were calculated, until we were within a 15% error. We used 15% error as the highest acceptable error given previous experience and expert opinion from co-authors considered experts in modeling (Gonsalves, Linas, Savinkina, Barocas). There is no standardized or uniformly agreed upon error when calibrating a model such as this, though we intend to "hit" targets as close as possible. Our algorithm for calibration was applied to all 23 cities: 1) run model with baseline inputs; 2) compare outcomes to calibration targets; 3) began calibration by attempting to "hit" targets in order (percent of ALL deaths attributable to fatal overdose among PWID/PEH, 1-year nonfatal overdose, remaining life expectancy, and percent retained on MOUD after 6-months), 4) we selected parameters with the least robust or most uncertain data to alter for the calibration process including: combined overdose prevalence (nonfatal and fatal), endocarditis prevalence, sequelae infection multiplier, overdose multipliers, and mortality probabilities. Our calibration process was such that no parameter was altered outside the feasible range.

Once the four calibration targets had been reached, the model was run for both the status quo and strategy 2 with a cohort of 100,000 individuals over a 10-year period.

eTable 4-26. Calibration targets for each city

eTable 4. Calibration targets for Atlanta

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	31%	28%	10%
Remaining life expectancy among PWID/PEH	50-59 years	55.2 years	0%
% retained on MOUD after 6-months	18-30%	30%	0%

eTable 5. Calibration targets for Baltimore

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	37%	12%
1-year nonfatal overdose among PWID/PEH	38%	35%	8%
Remaining life expectancy among PWID/PEH	50-59 years	55.7 years	0%
% retained on MOUD after 6-months	18-30%	33%	10%

eTable 6. Calibration targets for Boston

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	37%	12%
1-year nonfatal overdose among PWID/PEH	52%	47%	9.6%
Remaining life expectancy among PWID/PEH	50-59 years	52.5 years	0%
% retained on MOUD after 6-months	18-30%	32%	7%

eTable 7. Calibration targets for Chicago

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	38%	34%	11%
Remaining life expectancy among PWID/PEH	50-59 years	53.3 years	0%
% retained on MOUD after 6-months	18-30%	30%	0%

eTable 8. Calibration targets for Dallas

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	35%	6%
1-year nonfatal overdose among PWID/PEH	22%	23%	5%
Remaining life expectancy among PWID/PEH	50-59 years	58.1 years	0%

% retained on MOUD after 6-months	18-30%	29%	0%

eTable 9. Calibration targets for Denver

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	37%	12%
1-year nonfatal overdose among PWID/PEH	29%	26%	10%
Remaining life expectancy among PWID/PEH	50-59 years	52.6 years	0%
% retained on MOUD after 6-months	18-30%	31%	3%

eTable 10. Calibration targets for Detroit

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	35%	6%
1-year nonfatal overdose among PWID/PEH	25%	24%	4%
Remaining life expectancy among PWID/PEH	50-59 years	60.5 years	3%
% retained on MOUD after 6-months	18-30%	28%	0%

eTable 11. Calibration targets for Houston

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	32%	0%
1-year nonfatal overdose among PWID/PEH	16%	16%	0%
Remaining life expectancy among PWID/PEH	50-59 years	62.5 years	6%
% retained on MOUD after 6-months	18-30%	26%	0%

eTable 12. Calibration targets for Los Angeles

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	34%	3%
1-year nonfatal overdose among PWID/PEH	26%	27%	4%
Remaining life expectancy among PWID/PEH	50-59 years	55.7 years	0%
% retained on MOUD after 6-months	18-30%	27%	0%

eTable 13. Calibration targets for Memphis

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	34%	3%

1-year nonfatal overdose among PWID/PEH	27%	27%	0%
Remaining life expectancy among PWID/PEH	50-59 years	55.6 years	0%
% retained on MOUD after 6-months	18-30%	30%	0%

eTable 14. Calibration targets for Miami

Target	**Target Value**	**Model Value**	**Percent Error**
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	37%	35%	5%
Remaining life expectancy among PWID/PEH	50-59 years	54.0 years	0%
% retained on MOUD after 6-months	18-30%	28%	0%

eTable 15. Calibration targets for Nassau (Nassau Co, NY)

Target	**Target Value**	**Model Value**	**Percent Error**
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	37%	34%	8%
Remaining life expectancy among PWID/PEH	50-59 years	59 years	0%
% retained on MOUD after 6-months	18-30%	29%	0%

eTable 16. Calibration targets for New Orleans

Target	**Target Value**	**Model Value**	**Percent Error**
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	35%	6%
1-year nonfatal overdose among PWID/PEH	40%	41%	3%
Remaining life expectancy among PWID/PEH	50-59 years	49.5 years	1%
% retained on MOUD after 6-months	18-30%	31%	3%

eTable 17. Calibration targets for New York City

Target	**Target Value**	**Model Value**	**Percent Error**
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	29%	29%	0%
Remaining life expectancy among PWID/PEH	50-59 years	54.9 years	0%
% retained on MOUD after 6-months	18-30%	29%	0%

eTable 18. Calibration targets for Newark

	Target Value	**Model Value**	**Percent Error**

Target			
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	34%	3%
1-year nonfatal overdose among PWID/PEH	31%	30%	3%
Remaining life expectancy among PWID/PEH	50-59 years	56.9 years	0%
% retained on MOUD after 6-months	18-30%	26%	0%

eTable 19. Calibration targets for Philadelphia

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	50%	44%	12%
Remaining life expectancy among PWID/PEH	50-59 years	47.5 years	5%
% retained on MOUD after 6-months	18-30%	33%	10%

eTable 20. Calibration targets for Portland

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	37%	12%
1-year nonfatal overdose among PWID/PEH	30%	31%	3%
Remaining life expectancy among PWID/PEH	50-59 years	51.3 years	0%
% retained on MOUD after 6-months	18-30%	30%	0%

eTable 21. Calibration targets for San Diego

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	24%	24%	0%
Remaining life expectancy among PWID/PEH	50-59 years	57.4 years	0%
% retained on MOUD after 6-months	18-30%	29%	0%

eTable 22. Calibration targets for San Francisco

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	37%	12%
1-year nonfatal overdose among PWID/PEH	27%	27%	0%
Remaining life expectancy among PWID/PEH	50-59 years	58 years	0%
% retained on MOUD after 6-months	18-30%	29%	0%

eTable 23. Calibration targets for San Juan

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	36%	9%
1-year nonfatal overdose among PWID/PEH	18%	17%	6%
Remaining life expectancy among PWID/PEH	50-59 years	59.6 years	1%
% retained on MOUD after 6-months	18-30%	26%	0%

eTable e24. Calibration targets for Seattle

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	37%	12%
1-year nonfatal overdose among PWID/PEH	29%	30%	3%
Remaining life expectancy among PWID/PEH	50-59 years	53.8 years	0%
% retained on MOUD after 6-months	18-30%	29%	0%

eTable 25. Calibration targets for Virginia Beach

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	35%	6%
1-year nonfatal overdose among PWID/PEH	31%	32%	3%
Remaining life expectancy among PWID/PEH	50-59 years	59.7 years	1%
% retained on MOUD after 6-months	18-30%	30%	0%

eTable 26. Calibration targets for Washington D.C.

Target	Target Value	Model Value	Percent Error
% of ALL deaths attributable to fatal overdose among PWID/PEH	25-33%	33%	0%
1-year nonfatal overdose among PWID/PEH	27%	28%	4%
Remaining life expectancy among PWID/PEH	50-59 years	64.9 years	8%
% retained on MOUD after 6-months	18-30%	30%	0%

Model Scenarios

We used the REDUCE model to compare the following strategies for people experiencing unsheltered homelessness who inject drugs: (1) base case = population was not subjected to continual involuntary displacement and (2) "continual involuntary displacement" = change that occurred at the beginning of the simulation that impacted overdose probability, MOUD treatment initiation, and receptive syringe sharing. We assumed that these changes did not abate over time to model the reality that many unsheltered people face—that is, being under threat of constant displacement.

For this analysis, we simulated 23 separate cohorts over a 10 year time horizon in order to estimate long-term health outcomes of involuntary displacement, including: overdose mortality, serious injection-related infections (SIRI)s and SIRI-related mortality, hospitalizations, initiations on medications for opioid use disorder per 10,000 people; and average per-person overdoses (fatal and non-fatal) and life years lived over a 10-year time, and the population attributable fraction (PAF) of involuntary displacement to mortality among unsheltered PEH who inject drugs. Probabilistic sensitivity analyses and a threshold analysis were performed to evaluate major findings. Additional details and findings are reported within the accompanying manuscript.

Probabilistic sensitivity analyses

We ran probabilistic sensitivity analyses (credible intervals presented in Table S28-S52 within the supplement). Parameter distributions presented in Table 1 within the accompanying manuscript.

Input parameters

Key input parameters are summarized in Tables S27

eTable 27. Model Inputs

Parameter	Estimate/Range Atlanta	Estimate/Range Baltimore	Estimate/Range Boston	Estimate/Range Chicago	Source
Population					
Probability of injection drug use frequency*	Varies by age	Varies by age	Varies by age	Varies by age	7
No Current	1.27-10.2	0-8.82	2.25-17.39	0-6.98	
Low Frequency	16.46-27.12	5.95-19.19	15.73-29.17	7.14-25.58	
High Frequency	66.1-82.28	73.53-89.29	56.52-82.02	67.44-91.07	
Proportion Male (%)	71.99% (35.99-99.00)	71.43% (35.72-99.0)	65.56% (32.78-99.00)	62.65% (31.33-99.00)	7
Male Age Mean/STD	43.61 (11.56)	42.84 (11.56)	41.70 (11.34)	39.94 (10.67)	7
Female Age Mean/STD	39.20 (10.18)	41.49 (10.79)	37.36 (9.78)	37.73 (10.21)	7
Probability of skin cleaning (%)	58.87% (29.44-99.00)	58.94% (29.47-99.00)	69.09% (34.55-99.00)	64.40% (32.20-99.00)	7
Probability of needle sharing (%)	66.55% (33.28-99.00)	66.67% (33.34-99.00)	74.94% (37.47-99.00)	59.88% (29.94-99.00)	7
Sequelae of Drug use					
Probability of overdose					
Low frequency drug use	0.0019** (0.00095-0.0038)	0.0023** (0.00115-0.0046)	0.0028**(0.0014-0.0056)	0.0023** (0.00115-0.0046)	8,9
High frequency drug use	0.009** (0.0045-0.018)	0.012** (0.006-0.024)	0.0146**(0.0073-0.0292)	0.0120** (0.006-0.024)	8,9
Probability of fatal overdose	0.10** (0.09-0.24)	0.09** (0.09-0.24)	0.09** (0.09-0.24)	0.09** (0.09-0.24)	10
Combined probability of IE and SSTI, stratified by injection behavior profile	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	11,12,13,14-17
Proportion of infections attributable to IE	0.13 (0.03-0.40)	0.25** (0.03-0.40)	0.15** (0.03-0.40)	0.25** (0.03-0.40)	11,12,18,19
Probability of linking to inpatient care following nonfatal overdose	0.09** (0.045-0.18)	0.0970 (0.0485-0.194)	0.0970 (0.0485-0.194)	0.10** (0.05-0.20)	20

Probability of linking to inpatient care for IE	0.2 (0.1-0.4)	0.2 (0.1-0.4)	0.2 (0.1-0.4)	0.10** (0.05-0.20)	21
Probability of linking to inpatient care for SSTI	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0010** (0.0008-0.0040)	17
Previous overdose multiplier for risk of subsequent overdose	1 NFOD: 1.15 (0.72-1.82) 2-3 NFOD: 1.81 (1.19-2.27) 4-7 NFOD 2.12 (1.11-4.04) 8+ NFOD: 5.24 (1.56-17.01)	1 NFOD: 0.9** (0.72-1.82) 2-3 NFOD: 1.0** (1.19-2.27) 4-7 NFOD 1.5** (1.11-4.04) 8+ NFOD: 3.0** (1.56-17.01)	1 NFOD: 0.72** (0.72-1.82) 2-3 NFOD: 1.19** (1.19-2.27) 4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.5** (1.56-17.01)	1 NFOD: 0.72** (0.72-1.82) 2-3 NFOD: 1.19** (1.19-2.27) 4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.5** (1.56-17.01)	22
Previous infection multiplier for risk of subsequent infection	2.8 (1.50-5.10)	4.0** (1.50-5.10)	5.1** (1.50-5.10)	5.1** (1.50-5.10)	23
Inpatient					
Duration hospitalization SSTI (weeks), mean	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-4)	12
Duration hospitalization IE (weeks), mean	6 (4-8)	6 (4-8)	6 (4-8)	6 (4-8)	12
Probability of AMA discharge	0.08** (0.01-0.09)	0.08** (0.01-0.09)	0.05 (0.01-0.09)	0.09** (0.01-0.09)	Expert Opinion
Outpatient					
Outpatient addiction care linkages					
Linkage to outpatient addiction care from hospitalization, with MOUD	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99	0.99	Expert Opinion
Linkage to outpatient addiction care from the background/no intervention or hospitalization	0.007** (0.0035-0.014)	0.009** (0.0045-0.018)	0.008 (0.004-0.016)	0.0095** (0.00475-0.019)	24-28
Outpatient MOUD initiation					
Outpatient addiction care without ACS (%)	34.75% (0.1738-0.6950)	71.72% (0.3586-0.99)	71.17% (0.3559-0.99)	65.12% (0.3256-0.99)	7
Outpatient unlinking					
Spontaneous "unlinkage" from outpatient addiction care with MOUD	0.045** (0.0225-0.09)	0.043** (0.0215-0.086)	0.046** (0.023-0.092)	0.047** (0.0235-0.094)	28-30
Spontaneous "unlinkage" from outpatient addiction without MOUD	0.165** (0.0825-0.33)	0.172** (0.086-0.344)	0.166** (0.083-0.332)	0.165** (0.0825-0.330)	28-30
Mortality					
Background overdose subtracted mortality	Varies by age	Varies by age	Varies by age	Varies by age	31
18-24 years	17.76** (8.8-14.0)	17.76** (8.8-14.0)	22.2** (8.8-14.0)	17.76** (8.8-14.0)	

25-54 years	13.44** (7.9-8.8)	13.44** (7.9-8.8)	16.8** (7.9-8.8)	13.44** (7.9-8.8)	
55-61 years	7.36** (4.2-5.0)	7.36** (4.2-5.0)	9.2** (4.2-5.0)	7.36** (4.2-5.0)	
≥62 years	2.4** (1.4-1.7)	2.4** (1.4-1.7)	3.0** (1.4-1.7)	2.4** (1.4-1.7)	
Probability of death, untreated IE	0.400** (0.0848-0.5358)	0.450** (0.0848-0.5358)	0.450** (0.0848-0.5358)	0.350** (0.0848-0.5348)	[32]
Probability of death, untreated SSTI	0.007** (0.0035-0.014)	0.006** (0.003-0.012)	0.008** (0.004-0.016)	0.007** (0.0035-0.014)	[33]
Probability of death, inpatient with IE	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	[33-37]
Probability of death, inpatient with SSTI	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	[33]
Probability of death, inpatient with overdose	0.01** (0.005-0.02)	0.0095** (0.00475-0.019)	0.01** (0.005-0.02)	0.01** (0.005-0.02)	[38]

eTable 27 Continued. Model Inputs

Parameter	Estimate/Range Dallas	Estimate/Range Denver	Estimate/Range Detroit	Estimate/Range Houston	Source
Population					
Probability of injection drug use frequency*	Varies by age	Varies by age	Varies by age	Varies by age	[7]
No Current	0-5.56	4.25-16.67	0-7.27	6.38-15.38	
Low Frequency	7.46-36.59	18.4-34.43	6.9-17.31	21.28-47.27	
High Frequency	58.54-92.45	49.18-77.36	76.36-93.1	40.00-72.34	
Proportion Male (%)	62.90%	76.25%	63.60%	79.48%	[7]
Male Age Mean/STD	45.84 (14.79)	38.34 (9.92)	49.79 (12.45)	47.75 (12.32)	[7]
Female Age Mean/STD	41.32 (11.96)	37.58 (9.21)	43.41 (12.38)	40.59 (12.88)	[7]
Probability of skin cleaning (%)	55.60% (0.2780-0.99)	82.31% (0.4115-0.99)	53.78% (0.2694-0.99)	74.92% (0.3746-0.99)	[7]
Probability of needle sharing (%)	69.26% (0.3463-0.99)	60.54% (0.3027-0.99)	36.76% (0.1838-0.7353)	50.49% (0.2524-0.99)	[7]
Sequelae of Drug use					
Probability of overdose					
Low frequency drug use	0.0013** (0.00065-0.0026)	0.0019** (0.00095-0.0038)	0.0014 (0.0007-0.0028)	0.0010** (0.0005-0.002)	[8,9]
High frequency drug use	0.0065** (0.00325-0.013)	0.0095** (0.00475-0.019)	0.0073 (0.00365-0.0146)	0.005** (0.0025-0.01)	[8,9]
Probability of fatal overdose	0.11** (0.09-0.24)	0.09** (0.09-0.24)	0.11** (0.09-0.24)	0.12** (0.09-0.24)	[10]
Combined probability of IE and SSTI, stratified by injection behavior profile	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	[11,12,13,14-17]
Proportion of infections attributable to IE	0.13 (0.03-0.40)	0.13 (0.03-0.40)	0.13 (0.03-0.40)	0.13 (0.03-0.40)	[11,12,18,19]
Probability of linking to inpatient care following nonfatal overdose	0.0970 (0.0485-0.194)	0.0970 (0.0485-0.194)	0.09** (0.045-0.18)	0.0970 (0.0485-0.194)	[20]
Probability of linking to inpatient care for IE	0.2 (0.1-0.4)	0.2 (0.1-0.4)	0.2 (0.1-0.4)	0.2 (0.1-0.4)	[21]
Probability of linking to inpatient care for SSTI	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	[17]
Previous overdose multiplier for risk of subsequent overdose	1 NFOD: 1.15 (0.72-1.82) 2-3 NFOD: 1.81 (1.19-2.27) 4-7 NFOD 2.12 (1.11-4.04) 8+ NFOD: 5.24 (1.56-17.01)	1 NFOD: 1.15 (0.72-1.82) 2-3 NFOD: 1.81 (1.19-2.27) 4-7 NFOD 2.12 (1.11-4.04) 8+ NFOD: 5.24 (1.56-17.01)	1 NFOD: 1.15 (0.72-1.82) 2-3 NFOD: 1.81 (1.19-2.27) 4-7 NFOD 2.12 (1.11-4.04) 8+ NFOD: 5.24 (1.56-17.01)	1 NFOD: 1.15 (0.72-1.82) 2-3 NFOD: 1.81 (1.19-2.27) 4-7 NFOD 2.12 (1.11-4.04) 8+ NFOD: 5.24 (1.56-17.01)	[22]
Previous infection multiplier for risk of subsequent infection	2.8 (1.50-5.10)	2.8 (1.50-5.10)	2.8 (1.50-5.10)	2.8 (1.50-5.10)	[23]

Inpatient					
Duration hospitalization SSTI (weeks), mean	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-4)	[12]
Duration hospitalization IE (weeks), mean	6 (4-8)	6 (4-8)	6 (4-8)	6 (4-8)	[12]
Probability of AMA discharge	0.05 (0.01-0.09)	0.08** (0.01-0.09)	0.07** (0.01-0.09)	0.05 (0.01-0.09)	Expert Opinion
Outpatient					
Outpatient addiction care linkages					
Linkage to outpatient addiction care from hospitalization, with MOUD	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	Expert Opinion
Linkage to outpatient addiction care from the background/no intervention or hospitalization	0.008 (0.004-0.016)	0.009** (0.0045-0.018)	0.008 (0.004-0.016)	0.008 (0.004-0.016)	[24-28]
Outpatient MOUD initiation					
Outpatient addiction care without ACS (%)	39.58% (0.1979-0.7915)	52.30% (0.2615-0.99)	52.21% (0.2610-0.99)	26.06% (0.1303-0.5212)	[7]
Outpatient unlinking					
Spontaneous "unlinkage" from outpatient addiction care with MOUD	0.045** (0.0225-0.09)	0.048** (0.024-0.096)	0.045** (0.0225-0.09)	0.053 (0.026-0.105)	[28-30]
Spontaneous "unlinkage" from outpatient addiction without MOUD	0.165** (0.0825-0.330)	0.176** (0.088-0.352)	0.163** (0.0815-0.326)	0.172 (0.086-0.345)	[28-30]
Mortality					
Background overdose subtracted mortality	Varies by age	Varies by age	Varies by age	Varies by age	[31]
18-24 years	17.76** (8.8-14.0)	17.76** (8.8-14.0)	17.76** (8.8-14.0)	11.1 (8.8-14.0)	
25-54 years	13.44** (7.9-8.8)	13.44** (7.9-8.8)	13.44** (7.9-8.8)	8.4 (7.9-8.8)	
55-61 years	7.36** (4.2-5.0)	7.36** (4.2-5.0)	7.36** (4.2-5.0)	4.6 (4.2-5.0)	
≥62 years	2.4** (1.4-1.7)	2.4** (1.4-1.7)	2.4** (1.4-1.7)	1.5 (1.4-1.7)	
Probability of death, untreated IE	0.350* (0.0848-0.5358)	0.400* (0.0848-0.5358)	0.350* (0.0848-0.5358)	0.400* (0.0848-0.5358)	[32]
Probability of death, untreated SSTI	0.004** (0.002-0.008)	0.007** (0.0035-0.014)	0.004** (0.002-0.008)	0.004** (0.002-0.008)	[33]
Probability of death, inpatient with IE	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	[33-37]
Probability of death, inpatient with SSTI	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	[33]

Probability of death, inpatient with overdose	0.01** (0.005-0.02)	0.01** (0.005-0.02)	0.01** (0.005-0.02)	0.01** (0.005-0.02)	38

eTable 27 Continued. Model Inputs

Parameter	Estimate/Range Los Angeles	Estimate/Range Memphis	Estimate/Range Miami	Estimate/Range Nassau	Source
Population					
Probability of injection drug use frequency*	Varies by age	Varies by age	Varies by age	Varies by age	7
No Current	3.67-12.09	3.49-14.29	2.86-5.88	0-23.53	
Low Frequency	11.11-25.27	15.28-38.10	12.14-27.94	10.00-47.37	
High Frequency	62.64-81.48	47.62-80.23	66.18-85.00	52.63-90.00	
Proportion Male (%)	66.34%	74.07%	80.14%	66.67%	7
Male Age Mean/STD	41.53 (12.55)	44.34 (11.44)	42.07 (11.25)	47.45 (11.67)	7
Female Age Mean/STD	41.68 (12.81)	38.79 (10.82)	39.39 (10.47)	46.38 (11.13)	7
Probability of skin cleaning (%)	75.74% (0.3787-0.99)	49.72% (0.2486-0.99)	60.92% (0.3046-0.99)	53.49% (0.2674-0.99)	7
Probability of needle sharing (%)	63.12% (0.3166-0.99)	60.05% (0.3002-0.99)	53.42% (0.2671-0.99)	57.47% (0.2874-0.99)	7
Sequelae of Drug use					
Probability of overdose					
Low frequency drug use	0.0019** (0.00095-0.0038)	0.0016** (0.0008-0.0032)	0.0023** (0.00115-0.0046)	0.0028** (0.0014-0.0056)	8,9
High frequency drug use	0.009** (0.0045-0.018)	0.008** (0.004-0.016)	0.012** (0.006-0.024)	0.0140** (0.007-0.028)	8,9
Probability of fatal overdose	0.10** (0.09-0.24)	0.11** (0.09-0.24)	0.09** (0.09-0.24)	0.09** (0.09-0.24)	10
Combined probability of IE and SSTI, stratified by injection behavior profile	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	11,12,13,14-17
Proportion of infections attributable to IE	0.15** (0.03-0.40)	0.14** (0.03-0.40)	0.14** (0.03-0.40)	0.15** (0.03-0.40)	11,12,18,19
Probability of linking to inpatient care following nonfatal overdose	0.0970 (0.0485-0.194)	0.085** (0.0425-0.170)	0.090** (0.045-0.18)	0.0970 (0.0485-0.194)	20
Probability of linking to inpatient care for IE	0.2 (0.1-0.4)	0.2 (0.1-0.4)	0.2 (0.1-0.4)	0.2 (0.1-0.4)	21
Probability of linking to inpatient care for SSTI	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	17
Previous overdose multiplier for risk of subsequent overdose	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 0.72** (0.72-1.82)	22
	2-3 NFOD: 1.19** (1.19-2.27)	2-3 NFOD: 1.19** (1.19-2.27)	2-3 NFOD: 1.19** (1.19-2.27)	2-3 NFOD: 1.19** (1.19-2.27)	

	4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.5** (1.56-17.01)	4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.5** (1.56-17.01)	4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.5** (1.56-17.01)	4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.5** (1.56-17.01)	
Previous infection multiplier for risk of subsequent infection	5.1** (1.50-5.10)	5.1** (1.50-5.10)	5.1** (1.50-5.10)	5.1** (1.50-5.10)	23
Inpatient					
Duration hospitalization SSTI (weeks), mean	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-4)	12
Duration hospitalization IE (weeks), mean	6 (4-8)	6 (4-8)	6 (4-8)	6 (4-8)	12
Probability of AMA discharge	0.05 (0.01-0.09)	0.07** (0.01-0.09)	0.07** (0.01-0.09)	0.05 (0.01-0.09)	Expert Opinion
Outpatient					
Outpatient addiction care linkages					
Linkage to outpatient addiction care from hospitalization, with MOUD	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	Expert Opinion
Linkage to outpatient addiction care from the background/no intervention or hospitalization	0.008 (0.004-0.016)	0.008 (0.004-0.016)	0.008 (0.004-0.016)	0.008 (0.004-0.016)	24-28
Outpatient MOUD initiation					
Outpatient addiction care without ACS (%)	52.23% (0.2611-0.99)	28.31% (0.1415-0.5661)	36.84% (0.1842-7368)	57.47% (0.2874-0.99)	7
Outpatient unlinking					
Spontaneous "unlinkage" from outpatient addiction care with MOUD	0.049** (0.0245-0.098)	0.044** (0.022-0.088)	0.050** (0.025-0.10)	0.047** (0.0235-0.094)	28-30
Spontaneous "unlinkage" from outpatient addiction without MOUD	0.169** (0.0845-0.338)	0.163** (0.0815-0.326)	0.180** (0.09-0.36)	0.169** (0.0845-0.338)	28-30
Mortality					
Background overdose subtracted mortality	Varies by age	Varies by age	Varies by age	Varies by age	31
18-24 years	17.76** (8.8-14.0)	17.76** (8.8-14.0)	17.76** (8.8-14.0)	17.76** (8.8-14.0)	
25-54 years	13.44** (7.9-8.8)	13.44** (7.9-8.8)	13.44** (7.9-8.8)	13.44** (7.9-8.8)	

55-61 years	7.36** (4.2-5.0)	7.36** (4.2-5.0)	7.36** (4.2-5.0)	7.36** (4.2-5.0)	
≥62 years	2.4** (1.4-1.7)	2.4** (1.4-1.7)	2.4** (1.4-1.7)	2.4** (1.4-1.7)	
Probability of death, untreated IE	0.400** (0.085-0.536)	0.350** (0.085-0.536)	0.400** (0.085-0.536)	0.400** (0.085-0.536)	[32]
Probability of death, untreated SSTI	0.006** (0.003-0.012)	0.004** (0.002-0.008)	0.007** (0.0035-0.014)	0.004** (0.002-0.008)	[33]
Probability of death, inpatient with IE	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	[33-37]
Probability of death, inpatient with SSTI	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	[33]
Probability of death, inpatient with overdose	0.01** (0.005-0.02)	0.01** (0.005-0.02)	0.01** (0.005-0.02)	0.01** (0.005-0.02)	[38]

eTable 27 Continued. Model Inputs

Parameter	Estimate/Range New Orleans	Estimate/Range New York City	Estimate/Range Newark	Estimate/Range Philadelphia	Source
Population					
Probability of injection drug use frequency*	Varies by age	Varies by age	Varies by age	Varies by age	7
No Current	1.16-9.09	3.45-14.29	0-2.22	1.70-28.57	
Low Frequency	8.14-18.18	12.93-28.57	9.71-26.32	0-16.67	
High Frequency	72.73-90.70	57.14-83.62	73.68-88.35	71.43-94.89	
Proportion Male (%)	69.61%	79.30%	60.52%	69.27%	7
Male Age Mean/STD	39.38 (9.87)	41.86 (9.47)	44.01 (11.35)	37.78 (9.86)	7
Female Age Mean/STD	36.01 (8.27)	38.74 (9.49)	43.26 (10.36)	36.01 (7.54)	7
Probability of skin cleaning (%)	63.88% (0.3194-0.99)	82.04% (0.4102-0.99)	59.74% (0.2987-0.99)	74.00%** (0.37-0.99)	7
Probability of needle sharing (%)	76.17% (0.3808-0.99)	50.81% (0.2540-0.99)	46.28% (0.2314-0.9256)	73.00%** (0.3650-0.99)	7
Sequelae of Drug use					
Probability of overdose					
Low frequency drug use	0.0024** (0.0012-0.0048)	0.0024** (0.0012-0.0048)	0.0019** (0.00095-0.0038)	0.0028** (0.0014-0.0056)	8,9
High frequency drug use	0.0142** (0.0071-0.0284)	0.0100** (0.005-0.02)	0.009** (0.0045-0.018)	0.0146** (0.0073-0.0292)	8,9
Probability of fatal overdose	0.09** (0.09-0.24)	0.09** (0.09-0.24)	0.09** (0.09-0.24)	0.09** (0.09-0.24)	10
Combined probability of IE and SSTI, stratified by injection behavior profile	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	11,12,13,14-17
Proportion of infections attributable to IE	0.40** (0.03-0.40)	0.20** (0.03-0.40)	0.30** (0.03-0.40)	0.40** (0.03-0.40)	11,12,18,19
Probability of linking to inpatient care following nonfatal overdose	0.090** (0.045-0.18)	0.0970 (0.0485-0.194)	0.080** (0.04-0.16)	0.0485** (0.02425-0.097)	20
Probability of linking to inpatient care for IE	0.150** (0.075-0.30)	0.150** (0.075-0.30)	0.140** (0.07-0.28)	0.100** (0.05-0.200)	21
Probability of linking to inpatient care for SSTI	0.0008** (0.0008-0.0040)	0.0010** (0.0008-0.0040)	0.0015** (0.0008-0.0040)	0.0095** (0.0008-0.0040)	17
	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 1.00** (0.72-1.82)	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 0.72** (0.72-1.82)	22

Previous overdose multiplier for risk of subsequent overdose	2-3 NFOD: 1.19** (1.19-2.27) 4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.56** (1.56-17.01)	2-3 NFOD: 1.20** (1.19-2.27) 4-7 NFOD 1.30** (1.11-4.04) 8+ NFOD: 1.80** (1.56-17.01)	2-3 NFOD: 1.19** (1.19-2.27) 4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.56** (1.56-17.01)	2-3 NFOD: 1.19** (1.19-2.27) 4-7 NFOD 1.11** (1.11-4.04) 8+ NFOD: 1.56** (1.56-17.01)	
Previous infection multiplier for risk of subsequent infection	5.1** (1.50-5.10)	5.1** (1.50-5.10)	5.1** (1.50-5.10)	5.1** (1.50-5.10)	[23]
Inpatient					
Duration hospitalization SSTI (weeks), mean	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-4)	[12]
Duration hospitalization IE (weeks), mean	6 (4-8)	6 (4-8)	6 (4-8)	6 (4-8)	[12]
Probability of AMA discharge	0.07** (0.01-0.09)	0.08** (0.01-0.09)	0.09** (0.01-0.09)	0.07** (0.01-0.09)	Expert Opinion
Outpatient					
Outpatient addiction care linkages					
Linkage to outpatient addiction care from hospitalization, with MOUD	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	Expert Opinion
Linkage to outpatient addiction care from the background/no intervention or hospitalization	0.008 (0.004-0.016)	0.008 (0.004-0.016)	0.008 (0.004-0.016)	0.004** (0.002-0.008)	[24-28]
Outpatient MOUD initiation					
Outpatient addiction care without ACS (%)	39.95% (0.1998-0.7990)	80.38% (0.4019-0.99)	56.31% (0.2816-0.99)	67.32% (0.3366-0.99)	[7]
Outpatient unlinking					
Spontaneous "unlinkage" from outpatient addiction care with MOUD	0.045** (0.0225-0.09)	0.0485** (0.02425-0.097)	0.049** (0.0245-0.098)	0.048** (0.024-0.096)	[28-30]
Spontaneous "unlinkage" from outpatient addiction without MOUD	0.160** (0.08-0.32)	0.172** (0.086-0.344)	0.170** (0.085-0.34)	0.169** (0.0845-0.338)	[28-30]
Mortality					

Background overdose subtracted mortality	Varies by age	Varies by age	Varies by age	Varies by age	[31]
18-24 years	22.2** (8.8-14.0)	17.76** (8.8-14.0)	17.76** (8.8-14.0)	28.86** (8.8-14.0)	
25-54 years	16.8** (7.9-8.8)	13.44** (7.9-8.8)	13.44** (7.9-8.8)	21.84** (7.9-8.8)	
55-61 years	9.2** (4.2-5.0)	7.36** (4.2-5.0)	7.36** (4.2-5.0)	11.96** (4.2-5.0)	
≥62 years	3.0** (1.4-1.7)	2.4** (1.4-1.7)	2.4** (1.4-1.7)	3.90** (1.4-1.7)	
Probability of death, untreated IE	0.450** (0.0848-0.5358)	0.400** (0.0848-0.5358)	0.380** (0.0848-0.5358)	0.300** (0.0848-0.5358)	[32]
Probability of death, untreated SSTI	0.008** (0.004-0.016)	0.006** (0.003-0.012)	0.004** (0.002-0.008)	0.004** (0.002-0.008)	[33]
Probability of death, inpatient with IE	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0200** (0.0018-0.0161)	[33-37]
Probability of death, inpatient with SSTI	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0016** (0.0008-0.0032)	[33]
Probability of death, inpatient with overdose	0.01** (0.005-0.02)	0.01** (0.005-0.02)	0.01** (0.005-0.02)	0.0095** (0.00475-0.019)	[38]

eTable 27 Continued. Model Inputs

Parameter	Estimate/Range Portland	Estimate/Range San Diego	Estimate/Range San Francisco	Estimate/Range San Juan	Source
Population					
Probability of injection drug use frequency*	Varies by age	Varies by age	Varies by age	Varies by age	7
No Current	1.36-15.63	2.08-38.46	5.26-14.14	0-7.69	
Low Frequency	8.89-31.25	14.58-30.77	13.79-33.66	3.03-24.24	
High Frequency	53.13-85.03	30.77-83.33	54.46-80.7	69.23-96.97	
Proportion Male (%)	62.06%	76.24%	69.67%	84.06%	7
Male Age Mean/STD	36.18 (10.54)	43.38 (12.32)	44.43 (11.62)	43.77 (9.92)	7
Female Age Mean/STD	36.42 (11.51)	41.94 (11.52)	43.47 (11.25)	38.73 (8.01)	7
Probability of skin cleaning (%)	77.78% (0.3889-0.99)	62.31% (0.3116-0.99)	94.15% (0.4707-0.99)	71.70% (0.3585-0.99)	7
Probability of needle sharing (%)	72.11% (0.3606-0.99)	70.30% (0.3515-0.99)	42.89% (0.2145-0.8579)	52.19% (0.2609-0.99)	7
Sequelae of Drug use					
Probability of overdose					
Low frequency drug use	0.0020** (0.001-0.04)	0.0019** (0.00095-0.0038)	0.0014 (0.0007-0.0028)	0.0012** (0.0006-0.0024)	8,9
High frequency drug use	0.0100** (0.005-0.02)	0.0080** (0.004-0.016)	0.0073 (0.00365-0.0146)	0.004** (0.002-0.008)	8,9
Probability of fatal overdose	0.09** (0.09-0.24)	0.11** (0.09-0.24)	0.13 (0.09-0.24)	0.13 (0.09-0.24)	10
Combined probability of IE and SSTI, stratified by injection behavior profile	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	11,12,13,14-17
Proportion of infections attributable to IE	0.30** (0.03-0.40)	0.25** (0.03-0.40)	0.13 (0.03-0.40)	0.20** (0.03-0.40)	11,12,18,19
Probability of linking to inpatient care following nonfatal overdose	0.194** (0.097-0.388)	0.0970 (0.0485-0.194)	0.0970 (0.0485-0.194)	0.0970 (0.0485-0.194)	20
Probability of linking to inpatient care for IE	0.10** (0.05-0.20)	0.2 (0.1-0.4)	0.2 (0.1-0.4)	0.2 (0.1-0.4)	21
Probability of linking to inpatient care for SSTI	0.00095** (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	17
Previous overdose multiplier for risk of subsequent overdose	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 1.15 (0.72-1.82)	1 NFOD: 1.15 (0.72-1.82)	1 NFOD: 1.15 (0.72-1.82)	22
	2-3 NFOD: 1.19** (1.19-2.27)	2-3 NFOD: 1.81 (1.19-2.27)	2-3 NFOD: 1.81 (1.19-2.27)	2-3 NFOD: 1.81 (1.19-2.27)	
	4-7 NFOD 1.11** (1.11-4.04)	4-7 NFOD 2.12 (1.11-4.04)	4-7 NFOD 2.12 (1.11-4.04)	4-7 NFOD 2.12 (1.11-4.04)	

	8+ NFOD: 1.56** (1.56-17.01)	8+ NFOD: 5.24 (1.56-17.01)	8+ NFOD: 5.24 (1.56-17.01)	8+ NFOD: 5.24 (1.56-17.01)	
Previous infection multiplier for risk of subsequent infection	5.1** (1.50-5.10)	4.0** (1.50-5.10)	2.8 (1.50-5.10)	4.0** (1.50-5.10)	[23]
Inpatient					
Duration hospitalization SSTI (weeks), mean	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-4)	[12]
Duration hospitalization IE (weeks), mean	6 (4-8)	6 (4-8)	6 (4-8)	6 (4-8)	[12]
Probability of AMA discharge	0.03** (0.01-0.09)	0.05 (0.01-0.09)	0.05 (0.01-0.09)	0.08** (0.01-0.09)	Expert Opinion
Outpatient					
Outpatient addiction care linkages					
Linkage to outpatient addiction care from hospitalization, with MOUD	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	Expert Opinion
Linkage to outpatient addiction care from the background/no intervention or hospitalization	0.008 (0.004-0.016)	0.008 (0.004-0.016)	0.008 (0.004-0.016)	0.008 (0.004-0.016)	[24-28]
Outpatient MOUD initiation					
Outpatient addiction care without ACS (%)	53.27% (0.2663-0.99)	46.53% (0.2327-0.9307)	51.91% (0.2595-0.99)	37.50% (0.1875-0.7500)	[7]
Outpatient unlinking					
Spontaneous "unlinkage" from outpatient addiction care with MOUD	0.045** (0.0225-0.09)	0.045** (0.0225-0.09)	0.053 (0.026-0.105)	0.050** (0.025-0.10)	[28-30]
Spontaneous "unlinkage" from outpatient addiction without MOUD	0.164** (0.082-0.328)	0.166** (0.083-0.332)	0.172 (0.086-0.345)	0.170** (0.085-0.34)	[28-30]
Mortality					
Background overdose subtracted mortality	Varies by age	Varies by age	Varies by age	Varies by age	[31]
18-24 years	17.76** (8.8-14.0)	14.43** (8.8-14.0)	16.65** (8.8-14.0)	11.1 (8.8-14.0)	
25-54 years	13.44** (7.9-8.8)	10.92** (7.9-8.8)	12.60** (7.9-8.8)	8.4 (7.9-8.8)	
55-61 years	7.36** (4.2-5.0)	5.98** (4.2-5.0)	6.90** (4.2-5.0)	4.6 (4.2-5.0)	
≥62 years	2.4** (1.4-1.7)	1.95** (1.4-1.7)	2.25** (1.4-1.7)	1.5 (1.4-1.7)	
Probability of death, untreated IE	0.400** (0.0848-0.5358)	0.250** (0.0848-0.5358)	0.1623 (0.0848-0.5358)	0.200** (0.0848-0.5358)	[32]

Probability of death, untreated SSTI	0.006** (0.003-0.012)	0.004** (0.002-0.008)	0.002 (0.001-0.004)	0.003** (0.0015-0.006)	33
Probability of death, inpatient with IE	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	33-37
Probability of death, inpatient with SSTI	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	33
Probability of death, inpatient with overdose	0.01** (0.005-0.02)	0.01** (0.005-0.02)	0.019 (0.0095-0.0038)	0.012** (0.006-0.024)	38

eTable 27 Continued. Model Inputs

Parameter	Estimate/Range Seattle	Estimate/Range Virginia Beach	Estimate/Range Washington D.C.	Source
Population				
Probability of injection drug use frequency*	Varies by age	Varies by age	Varies by age	[7]
No Current	3.16-12.31	2.94-7.55	0-7.55	
Low Frequency	13.33-27.78	4.76-20.75	12.26-33.96	
High Frequency	66.67-83.16	71.70-90.48	58.49-83.02	
Proportion Male (%)	61.39%	67.45%	74.32%	[7]
Male Age Mean/STD	39.19 (11.94)	50.06 (11.01)	54.33 (8.75)	[7]
Female Age Mean/STD	39.61 (10.90)	43.31 (12.14)	50.68 (9.78)	[7]
Probability of skin cleaning (%)	83.45% (0.4173-0.99)	48.82% (0.2441-0.9764)	74.21% (0.3710-0.99)	[7]
Probability of needle sharing (%)	66.91% (0.3345-0.99)	62.11% (0.3105-0.99)	53.60% (0.2680-0.99)	[7]
Sequelae of Drug use				
Probability of overdose				
Low frequency drug use	0.0020** (0.001-0.004)	0.00205** (0.001025-0.0041)	0.0018** (0.0009-0.0036)	[8,9]
High frequency drug use	0.010** (0.005-0.02)	0.0105** (0.00525-0.021)	0.009** (0.0045-0.018)	[8,9]
Probability of fatal overdose	0.09** (0.09-0.24)	0.10** (0.09-0.24)	0.11** (0.09-0.24)	[10]
Combined probability of IE and SSTI, stratified by injection behavior profile	See Supplementary Table S1	See Supplementary Table S1	See Supplementary Table S1	[11,12,13,14-17]
Proportion of infections attributable to IE	0.30** (0.03-0.40)	0.25** (0.03-0.40)	0.13 (0.03-0.40)	[11,12,18,19]
Probability of linking to inpatient care following nonfatal overdose	0.100** (0.05-0.2)	0.970 (0.0485-0.194)	0.970 (0.0485-0.194)	[20]
Probability of linking to inpatient care for IE	0.100** (0.05-0.2)	0.200 (0.1-0.4)	0.200 (0.1-0.4)	[21]
Probability of linking to inpatient care for SSTI	0.00095** (0.0008-0.0040)	0.0019 (0.0008-0.0040)	0.0019 (0.0008-0.0040)	[17]
Previous overdose multiplier for risk of subsequent overdose	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 0.72** (0.72-1.82)	1 NFOD: 1.15 (0.72-1.82)	[22]
	2-3 NFOD: 1.19** (1.19-2.27)	2-3 NFOD: 1.19** (1.19-2.27)	2-3 NFOD: 1.81 (1.19-2.27)	
	4-7 NFOD 1.11** (1.11-4.04)	4-7 NFOD 1.11** (1.11-4.04)	4-7 NFOD 2.12 (1.11-4.04)	
	8+ NFOD: 1.56** (1.56-17.01)	8+ NFOD: 1.56** (1.56-17.01)	8+ NFOD: 5.24 (1.56-17.01)	
Previous infection multiplier for risk of subsequent infection	5.1** (1.50-5.10)	5.1** (1.50-5.10)	2.8 (1.50-5.10)	[23]
Inpatient				
Duration hospitalization SSTI (weeks), mean	2 (1-4)	2 (1-4)	2 (1-4)	[12]

Duration hospitalization IE (weeks), mean	6 (4-8)	6 (4-8)	6 (4-8)	12
Probability of AMA discharge	0.05 (0.01-0.09)	0.05 (0.01-0.09)	0.05 (0.01-0.09)	Expert Opinion
Outpatient				
Outpatient addiction care linkages				
Linkage to outpatient addiction care from hospitalization, with MOUD	0.99 (0.495-0.99)	0.99 (0.495-0.99)	0.99 (0.495-0.99)	Expert Opinion
Linkage to outpatient addiction care from the background/no intervention or hospitalization	0.008 (0.004-0.016)	0.008 (0.004-0.016)	0.008 (0.004-0.016)	24-28
Outpatient MOUD initiation				
Outpatient addiction care without ACS (%)	51.56% (0.2578-0.99)	37.65% (0.1882-0.7529)	56.31% (0.2815-0.99)	7
Outpatient unlinking				
Spontaneous "unlinkage" from outpatient addiction care with MOUD	0.048** (0.024-0.096)	0.048** (0.024-0.096)	0.048** (0.024-0.096)	28-30
Spontaneous "unlinkage" from outpatient addiction without MOUD	0.169** (0.0845-0.338)	0.169** (0.0845-0.338)	0.167** (0.0835-0.334)	28-30
Mortality				
Background overdose subtracted mortality	Varies by age	Varies by age	Varies by age	31
18-24 years	17.76** (8.8-14.0)	17.76** (8.8-14.0)	17.76** (8.8-14.0)	
25-54 years	13.44** (7.9-8.8)	13.44** (7.9-8.8)	13.44** (7.9-8.8)	
55-61 years	7.36** (4.2-5.0)	7.36** (4.2-5.0)	7.36** (4.2-5.0)	
≥62 years	2.4** (1.4-1.7)	2.4** (1.4-1.7)	2.4** (1.4-1.7)	
Probability of death, untreated IE	0.350** (0.0848-0.5358)	0.250** (0.0848-0.5358)	0.1623 (0.0848-0.5358)	32
Probability of death, untreated SSTI	0.004** (0.002-0.008)	0.004** (0.002-0.008)	0.002 (0.001-0.004)	33
Probability of death, inpatient with IE	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	0.0100 (0.0018-0.0161)	33-37
Probability of death, inpatient with SSTI	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	0.0008 (0.0004-0.0016)	33
Probability of death, inpatient with overdose	0.019 (0.0095-0.038)	0.013** (0.0065-0.026)	0.019 (0.0095-0.0038)	38

*Injection drug frequency varies by age group. Values in this table are the overall ranges used. No current use is defined as once a week or less. Low frequency drug use is defined as more than once a week. High frequency drug use is defined as more than once a day & once day.
**Calibrated inputs have been adjusted to meet the four calibration points. See Supplemental Table S4-S26 for a more detailed explanation of the calibration targets for each city.

eTables 28-50. City-specific outcomes

eTable 28. Modeled outcomes for Atlanta comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,226	0-4,491	3,267	1,425-8,094
SIRI Mortality per 10,000	1,264	33-2,320	1,176	0-1,991
Proportion of IE deaths from number of IE cases	71.00%	---	70.60%	---
Proportion of SSTI deaths from number of SSTI cases	33.90%	---	31.20%	---
SIRI cases per 10,000	3,058	556-5,130	3,089	25-4,925
Total number of people hospitalized per 10,000	1,895	830-3,095	2,776	879-4,405
Number of MOUD initiations per 10,000	8,288	5604-9,423	4,652	1,848-5,739
Average number of total overdoses per person	1.2	0.01-2.8	3.3	0.4-5.6
Average number of nonfatal overdoses per person	1.1	0.01-2.3	2.9	0.2-4.8
Average number of cases of IE per person	0.061	0.008-0.155	0.06	0-0.165
Average number of cases of SSTI per person	0.245	0.069-0.337	0.249	0.029-0.327
Average years lived per person	7.04	4.83-7.86	5.88	2.68-7.06

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 29. Modeled outcomes for Baltimore comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*

Overdose mortality per 10,000	1,204	13-4,849	3,379	1,715-8,676
SIRI Mortality per 10,000	1,135	0-1,735	1,054	0-1,575
Proportion of IE deaths from number of IE cases	73.30%	--	72.20%	--
Proportion of SSTI deaths from number of SSTI cases	26.50%	--	23.00%	--
SIRI cases per 10,000	3,141	403-4,353	3,212	0-4,237
Total number of people hospitalized per 10,000	2,123	750-3,387	3,150	902-4,817
Number of MOUD initiations per 10,000	20,446	13,117-23,327	12,864	4,661-15,318
Average number of total overdoses per person	1.3	0.04-3.0	3.7	0.5-6.0
Average number of nonfatal overdoses per person	1.2	0.04-2.5	3.4	0.3-5.2
Average number of cases of IE per person	0.065	0-0.145	0.064	0-0.136
Average number of cases of SSTI per person	0.249	0.049-0.290	0.257	0.019-0.288
Average years lived per person	6.99	4.70-8.00	5.72	2.22-6.91

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 30. Modeled outcomes for Boston comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,096	76-5,547	2,593	2,366-8,768
SIRI Mortality per 10,000	1,114	0-1,758	1,455	0-1,493
Proportion of IE deaths from number of IE cases	69.70%	--	70.40%	--
Proportion of SSTI deaths from number of SSTI cases	32.90%	--	29.30%	--

SIRI cases per 10,000	2,714	334-3,919	3,733	0-3,633
Total number of people hospitalized per 10,000	1,813	612-3,452	2,842	766-4,865
Number of MOUD initiations per 10,000	18,280	10,646-20,378	11,803	4,017-12,581
Average number of total overdoses per person	1.2	0.08-3.4	2.8	0.6-6.4
Average number of nonfatal overdoses per person	1.1	0.07-2.9	2.6	0.4-5.5
Average number of cases of IE per person	0.06	0-0.13	0.088	0-0.116
Average number of cases of SSTI per person	0.211	0.045-0.264	0.285	0.014-0.247
Average years lived per person	6.90	4.2-7.7	5.80	2.1-6.3

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 31. Modeled outcomes for Chicago comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	968	45-4,988	2,366	1,878-8,729
SIRI Mortality per 10,000	1,318	5-1,942	1,422	0-1,773
Proportion of IE deaths from number of IE cases	81.50%	--	81.80%	--
Proportion of SSTI deaths from number of SSTI cases	31.20%	--	28.10%	--
SIRI cases per 10,000	2,830	418-4,327	3,177	0-4,222
Total number of people hospitalized per 10,000	1,762	706-3,404	2,696	872-4,903
Number of MOUD initiations per 10,000	20,371	13,499-22,448	13,317	4,516-14,426
Average number of total overdoses per person	1.1	0.02-3.1	2.6	0.5-6.1

Average number of nonfatal overdoses per person	0.97	0.015-2.60	2.4	0.36-5.22
Average number of cases of IE per person	0.087	0-0.143	0.098	0-0.138
Average number of cases of SSTI per person	0.196	0.054-0.290	0.219	0.016-0.284
Average years lived per person	7.21	4.87-8.00	6.29	2.27-7.00

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 32. Modeled outcomes for Dallas comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	923	0-3,412	2,517	530-7,044
SIRI Mortality per 10,000	1,075	0-2,044	1,086	0-1,956
Proportion of IE deaths from number of IE cases	65.20%	--	64.10%	--
Proportion of SSTI deaths from number of SSTI cases	21.20%	--	19.10%	--
SIRI cases per 10,000	3,517	548-5,464	3,792	250-5,729
Total number of people hospitalized per 10,000	2,017	871-3,032	2,777	1,001-4,328
Number of MOUD initiations per 10,000	11,050	7,690-12,845	6,643	3,228-7,956
Average number of total overdoses per person	0.83	0-1.97	2.28	0.12-4.64
Average number of nonfatal overdoses per person	0.74	0.005-1.63	2.03	0.064-3.94
Average number of cases of IE per person	0.075	0-0.190	0.081	0-0.195

Average number of cases of SSTI per person	0.277	0.069-0.357	0.299	0.047-0.378
Average years lived per person	7.30	5.07-8.31	6.30	3.32-7.55

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 33. Modeled outcomes for Denver comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,021	0-3,785	2,954	1,224-7,919
SIRI Mortality per 10,000	952	76-1,939	921	0-1,799
Proportion of IE deaths from number of IE cases	71.90%	--	70.80%	--
Proportion of SSTI deaths from number of SSTI cases	31.50%	--	27.70%	--
SIRI cases per 10,000	2,439	1,063-4,949	2,584	57-4,524
Total number of people hospitalized per 10,000	1,792	804-3,099	2,837	930-4,475
Number of MOUD initiations per 10,000	16,349	7,077-13458	9,954	4,231-11,578
Average number of total overdoses per person	1.1	0-2.3	3.2	0.4-5.4
Average number of nonfatal overdoses per person	1.00	0-1.89	3.00	0.23-4.56
Average number of cases of IE per person	0.041	0.008-0.167	0.047	0-0.151
Average number of cases of SSTI per person	0.203	0.099-0.328	0.211	0.028-0.301
Average years lived per person	7.42	5.32-8.06	6.34	3.04-7.32

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 34. Modeled outcomes for Detroit comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	942	0-3,835	2,620	638-7,234
SIRI Mortality per 10,000	950	123-1,507	965	0-1,720
Proportion of IE deaths from number of IE cases	67.40%	--	67.40%	--
Proportion of SSTI deaths from number of SSTI cases	21.50%	--	19.00%	--
SIRI cases per 10,000	3,049	804-4,199	3,318	224-5,102
Total number of people hospitalized per 10,000	1,818	921-2,713	2,591	920-4,171
Number of MOUD initiations per 10,000	13,967	9,257-14,656	8,634	3,886-10,681
Average number of total overdoses per person	0.85	0-4.06	2.38	0.20-4.75
Average number of nonfatal overdoses per person	0.76	0-3.31	2.12	0.13-4.03
Average number of cases of IE per person	0.064	0-0.315	0.069	0-0.171
Average number of cases of SSTI per person	0.241	0.181-0.512	0.263	0.0416-0.339
Average years lived per person	7.08	4.99-8.08	6.09	3.05-7.34

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 35. Modeled outcomes for Houston comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*

Overdose mortality per 10,000	798	0-2,847	2,104	330-5,953
SIRI Mortality per 10,000	961	34-2,136	1,032	0-2,140
Proportion of IE deaths from number of IE cases	67.90%	--	68.00%	--
Proportion of SSTI deaths from number of SSTI cases	22.20%	--	20.10%	--
SIRI cases per 10,000	3,060	682-5,656	3,457	377-5,895
Total number of people hospitalized per 10,000	1,749	966-2,710	2,420	1,058-3,904
Number of MOUD initiations per 10,000	7,975	5,812-9044	4,702	2,881-5,611
Average number of total overdoses per person	0.65	0.016-1.54	1.73	0.10-3.76
Average number of nonfatal overdoses per person	0.57	0.023-1.25	1.52	0.069-3.16
Average number of cases of IE per person	0.062	0-0.194	0.07	0-0.199
Average number of cases of SSTI per person	0.244	0.076-0.372	0.276	0.055-0.391
Average years lived per person	7.80	5.85-8.60	7.00	4.43-8.07

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 36. Modeled outcomes for Los Angeles comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	877	04,160	1,851	1,163-7,958
SIRI Mortality per 10,000	1,100	3-1,924	1,186	0-1,798
Proportion of IE deaths from number of IE cases	68.10%	--	67.10%	--

Proportion of SSTI deaths from number of SSTI cases	28.30%	--	26.30%	--
SIRI cases per 10,000	2,947	484-4,548	3,319	85-4,624
Total number of people hospitalized per 10,000	1,700	760-3,022	2,474	900-4,512
Number of MOUD initiations per 10,000	14,572	9,783-16,181	9,225	3,450-10,480
Average number of total overdoses per person	0.87	0.05-2.48	2.1	0.35-5.37
Average number of nonfatal overdoses per person	0.78	0.05-2.07	1.9	0.23-4.58
Average number of cases of IE per person	0.067	0-0.156	0.077	0-0.154
Average number of cases of SSTI per person	0.228	0.061-0.298	0.255	0.030-0.308
Average years lived per person	7.30	5.01-8.07	6.50	2.82-7.25

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 37. Modeled outcomes for Memphis comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	959	0-4,314	2,213	1,156-7,893
SIRI Mortality per 10,000	1,352	0-2,134	1,432	0-1,853
Proportion of IE deaths from number of IE cases	67.60%	--	67.80%	--
Proportion of SSTI deaths from number of SSTI cases	20.20%	--	18.80%	--
SIRI cases per 10,000	4,220	597-5,754	4,606	110-5,522
Total number of people hospitalized per 10,000	2,055	932-3,218	2,667	1,030-4,328

Number of MOUD initiations per 10,000	7,700	5,319-8,779	4,534	1,878-5,260
Average number of total overdoses per person	0.87	0-2.58	2.02	0.31-5.36
Average number of nonfatal overdoses per person	0.77	0-2.15	1.80	0.19-4.57
Average number of cases of IE per person	0.105	0-0.199	0.116	0-0.184
Average number of cases of SSTI per person	0.317	0.072-0.376	0.345	0.036-0.368
Average years lived per person	7.00	4.95-7.94	6.20	2.83-7.22

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 38. Modeled outcomes for Miami comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,099	112-5,524	2,622	2,216-8,980
SIRI Mortality per 10,000	1,357	0-2,105	1,402	0-1,698
Proportion of IE deaths from number of IE cases	69.40%	--	70.10%	--
Proportion of SSTI deaths from number of SSTI cases	30.90%	--	28.60%	--
SIRI cases per 10,000	3,423	364-4,840	3,691	0-4,390
Total number of people hospitalized per 10,000	1,990	784-3,494	2,806	876-4,808
Number of MOUD initiations per 10,000	9,936	5,855-11,395	5,781	1,766-6,362
Average number of total overdoses per person	1.2	0.04-3.49	2.9	0.52-6.51
Average number of nonfatal overdoses per person	1.1	0.033-2.93	2.6	0.30-5.61

Average number of cases of IE per person	0.078	0-0.167	0.084	0-0.142
Average number of cases of SSTI per person	0.264	0.054-0.317	0.285	0.008-0.297
Average years lived per person	6.94	4.32-7.73	5.97	2.02-6.55

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 39. Modeled outcomes for Nassau comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,115	169-5,471	2,663	2,413-8,791
SIRI Mortality per 10,000	1,017	0-1,645	1,070	0-1,357
Proportion of IE deaths from number of IE cases	69.00%	--	68.00%	--
Proportion of SSTI deaths from number of SSTI cases	19.40%	--	17.70%	--
SIRI cases per 10,000	3,220	316-4,378	3,368	0-4,034
Total number of people hospitalized per 10,000	2,047	736-3,571	2,933	889-4,961
Number of MOUD initiations per 10,000	15,126	8,934-17,183	9,485	2,904-10,104
Average number of total overdoses per person	1.2	0.06-3.47	2.9	0.63-6.42
Average number of nonfatal overdoses per person	1.1	0.04-2.93	2.7	0.39-5.54
Average number of cases of IE per person	0.079	0-0.146	0.087	0-0.132
Average number of cases of SSTI per person	0.243	0.046-0.291	0.27	0.007-0.271
Average years lived per person	6.96	4.23-7.7	6.01	2.13-6.42

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 40. Modeled outcomes for New Orleans comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,234	229-6,159	2,869	2,804-9,271
SIRI Mortality per 10,000	1,647	0-2,085	1,664	0-1,663
Proportion of IE deaths from number of IE cases	78.10%	--	78.00%	--
Proportion of SSTI deaths from number of SSTI cases	35.80%	--	32.30%	--
SIRI cases per 10,000	3,033	349-4,439	3,161	0-3,894
Total number of people hospitalized per 10,000	1,822	692-3,642	2,742	755-4,930
Number of MOUD initiations per 10,000	10,121	5,697-11757	5,877	1,442-6,337
Average number of total overdoses per person	1.4	0.06-3.95	3.2	0.65-6.90
Average number of nonfatal overdoses per person	1.2	0.03-3.34	2.9	0.37-5.98
Average number of cases of IE per person	0.132	0-0.148	0.141	0-0.122
Average number of cases of SSTI per person	0.171	0.051-0.296	0.175	0.010-0.267
Average years lived per person	6.60	3.89-7.51	5.60	1.59-6.08

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 41. Modeled outcomes for New York City comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	867	0-4,961	2,177	503-8,844

SIRI Mortality per 10,000	1,001	168-1,600	1,086	0-1,510
Proportion of IE deaths from number of IE cases	77.30%	--	76.90%	--
Proportion of SSTI deaths from number of SSTI cases	30.50%	--	28.10%	--
SIRI cases per 10,000	2,350	803-3,661	2,668	388-3,712
Total number of people hospitalized per 10,000	1,572	829-3,073	2,472	1,048-4,507
Number of MOUD initiations per 10,000	21,731	14,512-24,778	15,373	5,434-18,609
Average number of total overdoses per person	0.98	0-2.72	2.44	0.24-5.34
Average number of nonfatal overdoses per person	0.89	0-2.22	2.22	0.19-4.46
Average number of cases of IE per person	0.061	0-0.132	0.069	0-0.131
Average number of cases of SSTI per person	0.174	0.084-0.234	0.198	0.052-0.240
Average years lived per person	7.3	4.91-8.29	6.4	2.27-7.81

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 42. Modeled outcomes for Newark comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	795	0-4,198	1,954	1,149-8,174
SIRI Mortality per 10,000	1,340	0-1,952	1,504	0-1,753
Proportion of IE deaths from number of IE cases	78.30%	--	78.10%	--
Proportion of SSTI deaths from	22.00%	--	20.30%	--

number of SSTI cases				
SIRI cases per 10,000	3,153	515-4,793	3,644	99-4,829
Total number of people hospitalized per 10,000	1,670	793-2,869	2,378	832-4,212
Number of MOUD initiations per 10,000	15,213	10,840-17,300	9,812	3,632-11,345
Average number of total overdoses per person	0.87	0.02-2.55	2.15	0.38-5.46
Average number of nonfatal overdoses per person	0.8	0.02-2.13	1.95	0.27-4.65
Average number of cases of IE per person	0.115	0-0.161	0.132	0-0.160
Average number of cases of SSTI per person	0.2	0.062-0.319	0.232	0.030-0.323
Average years lived per person	7.11	5.04-8.01	6.34	2.63-7.24

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 43. Modeled outcomes for Philadelphia comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,313	0-7,433	3,035	1,983-10,308
SIRI Mortality per 10,000	1,362	103-1,751	1,344	0-1,439
Proportion of IE deaths from number of IE cases	79.70%	--	79.70%	--
Proportion of SSTI deaths from number of SSTI cases	18.00%	--	16.50%	--
SIRI cases per 10,000	3,002	719-3,916	3,041	44-3,564
Total number of people hospitalized per 10,000	1,627	794-2,539	2,168	717-3,436

Number of MOUD initiations per 10,000	8,460	3,911-10,454	5,320	596-6,642
Average number of total overdoses per person	1.5	0-4.22	3.3	0.70-6.74
Average number of nonfatal overdoses per person	1.3	0-3.48	3	0.50-5.71
Average number of cases of IE per person	0.133	0-0.147	0.133	0-0.123
Average number of cases of SSTI per person	0.167	0.079-0.245	0.171	0.022-0.233
Average years lived per person	6.40	2.96-7.92	5.40	0.63-6.71

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 44. Modeled outcomes for Portland comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	890	36-4,595	2,204	1,631-8,377
SIRI Mortality per 10,000	1,344	0-2,079	1,437	0-1,821
Proportion of IE deaths from number of IE cases	79.80%	--	79.30%	--
Proportion of SSTI deaths from number of SSTI cases	28.70%	--	25.60%	--
SIRI cases per 10,000	2,882	496-4,585	3,224	113-4,403
Total number of people hospitalized per 10,000	2,263	826-4,742	3,623	1,442-6,514
Number of MOUD initiations per 10,000	15,001	10,539-16,354	9,445	3,326-10,627
Average number of total overdoses per person	0.98	0.04-2.80	2.41	0.46-5.80
Average number of nonfatal overdoses per person	0.895	0.04-2.34	2.194	0.30-4.96

Average number of cases of IE per person	0.101	0-0.154	0.114	0-0.141
Average number of cases of SSTI per person	0.187	0.063-0.305	0.209	0.030-0.300
Average years lived per person	7.40	5.20-8.06	6.50	2.65-7.17

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 45. Modeled outcomes for San Diego comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,080	0-3,885	2,925	957-7,607
SIRI Mortality per 10,000	1,055	0-1,749	1,050	0-1,652
Proportion of IE deaths from number of IE cases	57.80%	--	57.20%	--
Proportion of SSTI deaths from number of SSTI cases	20.80%	--	18.90%	--
SIRI cases per 10,000	3,246	486-5,083	3,389	118-5,184
Total number of people hospitalized per 10,000	1,973	862-3,144	2,780	969-4,496
Number of MOUD initiations per 10,000	13,055	9,463-14,756	7,822	3,889-9,668
Average number of total overdoses per person	0.98	0.04-2.28	2.6	0.29-5.08
Average number of nonfatal overdoses per person	0.87	0.04-1.90	2.4	0.19-4.32
Average number of cases of IE per person	0.103	0-0.175	0.107	0-0.176
Average number of cases of SSTI per person	0.222	0.062-0.333	0.232	0.033-0.342
Average years lived per person	7.40	5.48-8.30	6.30	3.38-7.53

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 46. Modeled outcomes for San Francisco comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,002	0-3,890	2,412	1,367-8,113
SIRI Mortality per 10,000	929	0-1,337	1,043	0-1,629
Proportion of IE deaths from number of IE cases	64.40%	--	64.40%	--
Proportion of SSTI deaths from number of SSTI cases	30.80%	--	28.50%	--
SIRI cases per 10,000	2,204	637-5,160	2,549	53-4,165
Total number of people hospitalized per 10,000	1,520	1,089-3,170	2,337	883-4,532
Number of MOUD initiations per 10,000	15,835	11,855-17,358	9,862	3,626-11,257
Average number of total overdoses per person	0.90	0.02-2.20	2.17	0.41-5.51
Average number of nonfatal overdoses per person	0.80	0.02-1.81	1.93	0.27-4.70
Average number of cases of IE per person	0.075	0-0.184	0.088	0-0.136
Average number of cases of SSTI per person	0.146	0.074-0.332	0.167	0.025-0.281
Average years lived per person	7.2	5.94-8.67	6.3	2.73-7.18

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 47. Modeled outcomes for San Juan comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,046	0-2,558	2,069	0-6,868

SIRI Mortality per 10,000	789	43-1,838	1,155	128-1,816
Proportion of IE deaths from number of IE cases	55.50%	--	55.40%	--
Proportion of SSTI deaths from number of SSTI cases	17.20%	--	16.20%	--
SIRI cases per 10,000	3,738	807-6,068	4,217	1,090-6,478
Total number of people hospitalized per 10,000	2,003	1,138-2,918	2,614	1,654-4,212
Number of MOUD initiations per 10,000	11,335	9,369-12,749	6,867	4,009-8,674
Average number of total overdoses per person	0.60	0.04-1.37	1.60	0-3.83
Average number of nonfatal overdoses per person	0.52	0.05-1.11	1.39	0-3.15
Average number of cases of IE per person	0.11	0-0.22	0.12	0-0.25
Average number of cases of SSTI per person	0.269	0.088-0.389	0.301	0.121-0.402
Average years lived per person	7.80	6.44-8.60	7.00	4.10-8.73

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 48. Modeled outcomes for Seattle comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	925	0-5,738	2,249	750-9,398
SIRI Mortality per 10,000	1,205	142-1,743	1,290	0-1,629
Proportion of IE deaths from number of IE cases	79.10%	--	78.70%	--

Proportion of SSTI deaths from number of SSTI cases	22.10%	--	20.30%	--
SIRI cases per 10,000	2,860	921-4,261	3,142	306-4,242
Total number of people hospitalized per 10,000	1,771	1,019-3,480	2,654	1,250-4,841
Number of MOUD initiations per 10,000	14,441	9,012-16,789	9,055	2,605-11,148
Average number of total overdoses per person	1.00	0-3.12	2.50	0.31-5.74
Average number of nonfatal overdoses per person	0.92	0-2.55	2.25	0.23-4.80
Average number of cases of IE per person	0.101	0-0.157	0.112	0-0.150
Average number of cases of SSTI per person	0.185	0.096-0.269	0.203	0.049-0.274
Average years lived per person	7.30	4.61-8.56	6.50	1.89-7.96

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 49. Modeled outcomes for Virginia Beach comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,040	0-5,903	2,491	882-9,483
SIRI Mortality per 10,000	1,265	116-1,562	1,288	0-1,397
Proportion of IE deaths from number of IE cases	57.10%	--	57.00%	--
Proportion of SSTI deaths from number of SSTI cases	19.70%	--	17.90%	--
SIRI cases per 10,000	3,924	807-4,826	4,194	235-4,637
Total number of people hospitalized per 10,000	2,157	1,110-3,656	2,920	1,336-4,871

Number of MOUD initiations per 10,000	9,949	6,040-11,901	5,864	1,521-7,422
Average number of total overdoses per person	1.00	0-3.23	2.50	0.36-5.84
Average number of nonfatal overdoses per person	0.94	0-2.65	2.22	0.27-4.89
Average number of cases of IE per person	0.131	0-0.182	0.137	0-0.166
Average number of cases of SSTI per person	0.261	0.093-0.300	0.282	0.045-0.297
Average years lived per person	6.81	4.19-8.16	5.91	1.56-7.54

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

eTable 50. Modeled outcomes for Washington D.C. comparing no-displacement strategy to continual involuntary displacement strategy

Outcomes	Status Quo (No Displacement) Estimate	Credible Interval*	Strategy 2 (Continual displacement) Estimate	Credible Interval*
Overdose mortality per 10,000	1,148	0-4,771	3,139	301-8,616
SIRI Mortality per 10,000	528	70-1,085	501	0-1,032
Proportion of IE deaths from number of IE cases	47.80%	--	46.10%	--
Proportion of SSTI deaths from number of SSTI cases	13.10%	--	11.70%	--
SIRI cases per 10,000	2,615	839-4,331	2,701	394-4,385
Total number of people hospitalized per 10,000	1,937	1,085-3,281	2,784	1,285-4,529
Number of MOUD initiations per 10,000	14,725	10,242-16,905	8,913	3,511-11,693
Average number of total overdoses per person	1.00	0-2.57	2.80	0.17-5.10
Average number of nonfatal	0.91	0-2.10	2.50	0.15-4.25

overdoses per person				
Average number of cases of IE per person	0.053	0-0.164	0.054	0-0.161
Average number of cases of SSTI per person	0.208	0.091-0.269	0.216	0.057-0.277
Average years lived per person	6.87	4.83-7.91	5.78	2.27-7.59

*99.5% credible interval was derived from the probabilistic sensitivity analysis. Credible intervals were not calculated for certain outcomes because they are not primary outcomes from the model, but rather were calculated by combining multiple outcomes.

Important note: Outcomes in the continual displacement strategy including SIRI mortality, proportion of IE and SSTI deaths from number of cases may be lower than those of the no continual displacement strategy in many cities. This is not to suggest that continual displacement is protective against infections. Rather, this finding highlights the concept of competing risks of death. Substantial mortality associated with overdose with displacement results in individuals dying of overdose before they get an infection.

eTable 51. Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city											
Outcomes	**Atlanta**	**Baltimore**	**Boston**	**Chicago**	**Dallas**	**Denver**	**Detroit**	**Houston**	**Los Angeles**	**Memphis**	**Miami**
Overdose mortality per 10,000	90.9	94.9	81.2	83.9	92.7	97.3	94.2	90	71.4	79.1	81.9
SIRI mortality per 10,000	-7.2	-7.4	26.5	7.6	1	-3.3	1.5	7.1	7.5	5.7	3.3
Proportion of IE deaths from number of IE cases per 10,000	-0.6	-1.5	1	0.37	-1.7	-1.5	0	0.1	-1.5	0.3	1
Proportion of SSTI deaths from number of SSTI cases per 10,000	-8.3	-14.1	-11.6	-10.5	-10.4	-12.8	-12.3	-9.9	-7.3	-7.2	-7.7
SIRI cases per 10,000	1	2.2	31.6	11.6	7.5	5.8	8.4	12.2	11.9	8.7	7.5
Number of people hospitalized per 10,000	37.7	39	44.2	41.9	31.7	45.1	35.1	32.2	37.1	25.9	34
Number of MOUD initiations per 10,000	-56.2	-45.5	-43.1	-41.9	-49.8	-48.6	-47.2	-51.6	-44.9	-51.8	-52.9
Average number of total overdoses per person	93.3	96	80	81.1	93.2	97.7	94.7	90.8	82.8	79.6	82.9
Average number of nonfatal overdoses per person	90	95.7	81.1	84.9	93.1	100	94.4	90.9	83.6	80.2	81.1
Average number of cases of endocarditis per person	-1.7	-1.6	37.8	11.9	7.7	13.6	7.5	12.1	13.9	9.9	7.5
Average number of severe SSTI per person	1.6	3.2	29.8	11.1	7.6	3.9	8.7	12.3	11.2	8.5	7.8
Average years lived per person	-17.9	-20	-17.3	-13.6	-14.7	-15.7	-15	-10.8	-11.6	-12.1	-15

eTable 51 (continued). Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city												
Outcomes	**Nassau**	**New Orleans**	**New York City**	**Newark**	**Philadelphia**	**Portland**	**San Diego**	**San Francisco**	**San Juan**	**Seattle**	**Virginia Beach**	**Washington D.C.**
Overdose mortality per 10,000	81.9	79.7	86.1	84.3	79.2	84.9	92.1	82.6	89.6	83.4	82.2	92.9
SIRI mortality per 10,000	5.1	1.0	8.1	11.5	-1.3	6.7	-0.5	11.5	9.9	6.8	1.8	-5.1
Proportion of IE deaths from number of IE cases per 10,000	-1.5	-0.1	-0.5	-0.3	0	-0.6	-1	0	-0.2	-0.5	-0.2	-3.6
Proportion of SSTI deaths from number of SSTI cases per 10,000	-9.2	-10.3	-8.2	-8	-8.7	-11.4	-9.6	-7.8	-6	-8.5	-9.6	-11.3
SIRI cases per 10,000	4.5	4.1	12.7	14.4	1.3	11.2	4.3	14.5	12	9.4	6.7	3.2
Number of people hospitalized per 10,000	35.6	40.3	44.5	35	28.5	46.2	34	42.4	26.5	39.9	30.1	35.9
Number of MOUD initiations per 10,000	-45.8	-53.1	-34.3	-43.2	-45.6	-45.5	-50.1	-46.5	-49.1	-45.8	-51.8	-49.2
Average number of total overdoses per person	82.9	78.3	85.4	84.8	75	84.4	90.5	82.7	90.9	85.7	85.7	94.7
Average number of nonfatal overdoses per person	84.2	82.9	85.5	83.6	79.1	84.1	93.2	82.8	91.1	83.7	81	93.1
Average number of cases of endocarditis per person	9.6	6.6	12.3	13.8	0	12.1	3.8	16	13.3	10.3	4.5	1.9
Average number of severe SSTI per person	10.5	2.3	12.9	14.8	2.4	11.1	4.4	13.4	11.2	9.3	7.7	3.8
Average years lived per person	-14.6	-16.4	-13.1	-11.4	-16.9	-12.9	-16.1	-13.3	-10.8	-11.6	-14.2	-17.2

Notes: SIRI = severe injection-related infections; IE = infective endocarditis; SSTI = skin and soft tissue infections; MOUD = medications for opioid use disorder
For population estimates in this table, these estimates are per 10,000 PEH who inject opiods. The estimates are relative differences between the two strategies.
Values in this table represent the percent difference between the two strategies. This was calculated as follows: $|V_1 - V_2|/[(V_1 + V_2)/2] * 100$. Absolute differences are noted in Figure 2.

eTable 52. Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of initiating MOUD											
Outcomes	**Atlanta**	**Baltimore**	**Boston**	**Chicago**	**Dallas**	**Denver**	**Detroit**	**Houston**	**Los Angeles**	**Memphis**	**Miami**
Overdose mortality per 10,000	87.6	81.5	75.7	77.9	88.5	91.4	89.2	86.2	78.2	77.0	77.7
SIRI mortality per 10,000	-10.2	0.0	19.6	1.2	-3.3	-7.3	-2.7	3.7	2.4	1.3	0.4
Proportion of IE deaths from number of IE cases per 10,000	-1.6	0.1	-0.4	0.1	0.0	-0.8	0.0	0.9	-0.8	-1.0	1.6
Proportion of SSTI deaths from number of SSTI cases per 10,000	-9.5	-6.5	-11.1	-8.4	-7.9	-10.3	-13.1	-9.6	-8.1	-6.0	-7.0
SIRI cases per 10,000	-2.9	3.5	25.1	4.8	1.3	-0.3	4.7	7.8	6.9	4.7	4.0
Number of people hospitalized per 10,000	34.9	34.1	39.7	37.1	27.4	39.9	31.7	28.8	32.3	22.6	30.9
Number of MOUD initiations per 10,000	-16.8	-12.1	-15.2	-11.3	-11.8	-14.3	-12.5	-9.7	-9.9	-10.8	-13.2
Average number of total overdoses per person	88.4	81.7	75.1	78.5	88.4	90.2	89.2	87.4	78.3	76.8	77.0
Average number of nonfatal overdoses per person	88.5	81.7	75.0	78.6	88.3	90.1	89.2	87.6	78.3	76.8	76.9
Average number of cases of endocarditis per person	-6.0	1.7	30.8	5.3	0.1	-0.7	3.2	10.1	9.0	4.6	3.5
Average number of severe SSTI per person	-2.2	4.2	23.4	4.6	1.7	-0.2	5.2	7.2	6.2	4.7	4.2
Average years lived per person	-16.3	-12.1	-14.8	-11.2	-12.2	-13.6	-12.6	-9.4	-9.7	-10.8	-13.4

eTable 52 (continued). Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of initiating MOUD

Outcomes	Nassau	New Orleans	New York City	Newark	Philadelphia	Portland	San Diego	San Francisco	San Juan	Seattle	Virginia Beach	Washington D.C.
Overdose mortality per 10,000	77.0	76.0	81.9	79.3	76.7	79.9	87.3	77.9	86.9	80.2	78.8	87.3
SIRI mortality per 10,000	-1.3	-2.1	2.5	5.9	-3.5	2.2	-5.5	4.1	4.6	1.4	-1.6	-8.6
Proportion of IE deaths from number of IE cases per 10,000	-2.6	0.2	-0.5	-0.5	0.3	-0.7	-2.7	1.6	0.1	-0.3	0.2	-1.0
% Mortality SSTI	-8.3	-8.7	-10.0	-9.9	-8.2	-8.9	-11.9	-6.7	-7.1	-7.8	-8.6	-13.7
SIRI cases per 10,000	4.3	0.6	7.2	9.2	-1.5	6.1	0.8	6.4	7.2	3.8	2.1	-0.9
Number of people hospitalized per 10,000	31.9	36.6	40.1	31.4	25.8	42.9	30.1	37.6	23.9	34.9	26.1	32.2
Number of MOUD initiations per 10,000	-12.9	-15.3	-11.6	-10.0	-16.5	-11.5	-13.8	-11.6	-10.1	-11.1	-13.4	-15.4
Average number of total overdoses per person	76.6	76.4	81.0	79.1	75.9	79.0	86.8	77.7	87.7	79.2	77.5	88.0
Average number of nonfatal overdoses per person	76.6	76.4	80.9	79.0	75.8	78.9	86.8	77.7	87.8	79.1	77.4	88.1
Average number of cases of endocarditis per person	3.4	1.3	9.4	9.6	-2.2	6.1	1.7	6.4	8.3	4.6	1.3	-1.6
Average number of severe SSTI per person	4.6	0.0	6.4	9.0	-0.9	6.1	0.4	6.4	6.7	3.3	2.5	-0.8
Average years lived per person	-12.7	-15.2	-11.0	-9.9	-16.4	-10.9	-13.8	-11.4	-9.9	-11.0	-12.8	-15.1

Notes: SIRI = severe injection-related infections; IE = infective endocarditis; SSTI = skin and soft tissue infections; MOUD = medications for opioid use disorder
For population estimates in this table, these estimates are per 10,000 PEH who inject opioids.

eTable 53. Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of syringe sharing											
Outcomes	**Atlanta**	**Baltimore**	**Boston**	**Chicago**	**Dallas**	**Denver**	**Detroit**	**Houston**	**Los Angeles**	**Memphis**	**Miami**
Overdose mortality per 10,000	92.7	89.9	81.8	85.6	94.5	98.6	95.0	90.6	83.5	82.2	83.1
SIRI mortality per 10,000	-23.9	-11.0	10.4	-9.5	-12.8	-21.6	-16.1	-11.3	-9.0	-13.9	-14.6
Proportion of IE deaths from number of IE cases per 10,000	-0.8	-1.0	0.9	0.5	-1.0	-1.8	-1.3	-0.3	0.7	-0.9	1.2
Proportion of SSTI deaths from number of SSTI cases per 10,000	-9.1	-6.9	-7.7	-7.5	-5.2	-10.2	-8.5	-6.6	-7.1	-6.0	-5.4
SIRI cases per 10,000	-16.5	-6.8	14.1	-6.1	-8.6	-13.6	-9.7	-6.8	-4.8	-9.3	-11.3
Number of people hospitalized per 10,000	34.5	36.4	41.4	39.1	27.3	41.9	30.6	26.2	33.0	19.6	31.2
Number of MOUD initiations per 10,000	-55.0	-38.6	-41.3	-40.8	-49.3	-47.9	-46.0	-49.9	-43.3	-50.3	-50.3
Average number of total overdoses per person	93.1	89.2	81.2	85.1	94.6	97.5	95.7	92.3	84.3	81.4	82.5
Average number of nonfatal overdoses per person	93.2	89.1	81.1	85.0	94.7	97.4	95.8	92.5	84.5	81.3	82.4
Average number of cases of endocarditis per person	-23.0	-8.6	17.2	-6.9	-11.5	-17.2	-13.7	-8.9	-6.4	-12.8	-13.7
Average number of severe SSTI per person	-15.0	-6.0	13.2	-5.7	-7.8	-12.8	-8.7	-6.3	-4.4	-8.2	-10.6
Average years lived per person	-17.0	-13.1	-15.6	-12.4	-12.9	-14.9	-13.7	-9.1	-9.8	-10.6	-12.9

eTable 53 (continued). Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of syringe sharing

Outcomes	Nassau	New Orleans	New York City	Newark	Philadelphia	Portland	San Diego	San Francisco	San Juan	Seattle	Virginia Beach	Washington D.C.
Overdose mortality per 10,000	83.6	81.9	87.9	85.8	80.9	86.1	94.6	86.2	89.8	85.0	84.3	93.1
SIRI mortality per 10,000	-13.4	-14.0	-10.6	-7.3	-16.8	-8.8	-16.9	-6.9	-9.6	-9.2	-14.2	-22.5
Proportion of IE deaths from number of IE cases per 10,000	-1.8	-0.9	0.6	-0.1	0.2	-0.4	-2.0	0.3	0.5	-0.2	-1.3	-0.5
% Mortality SSTI	-6.3	-9.0	-8.5	-7.1	-7.6	-7.3	-6.5	-7.7	-3.8	-7.5	-4.7	-9.5
SIRI cases per 10,000	-7.8	-10.2	-6.3	-3.8	-14.4	-5.1	-12.1	-3.6	-8.1	-6.6	-10.3	-15.2
Number of people hospitalized per 10,000	32.7	38.6	40.8	30.5	24.6	45.2	30.6	41.1	19.1	36.7	25.7	32.1
Number of MOUD initiations per 10,000	-44.8	-51.9	-32.7	-41.1	-44.5	-43.8	-49.2	-45.3	-47.1	-44.3	-50.2	-48.2
Average number of total overdoses per person	83.3	82.2	86.4	85.7	80.1	85.1	93.4	87.0	90.6	85.2	82.9	93.7
Average number of nonfatal overdoses per person	83.3	82.3	86.2	85.6	80.0	85.0	93.3	87.1	90.6	85.2	82.8	93.8
Average number of cases of endocarditis per person	-12.3	-10.2	-6.9	-6.0	-15.9	-6.7	-14.2	-3.1	-8.3	-6.7	-13.4	-21.6
Average number of severe SSTI per person	-6.3	-10.2	-6.1	-2.5	-13.2	-4.3	-11.2	-3.9	-8.1	-6.5	-8.8	-13.6
Average years lived per person	-13.3	-15.3	-10.9	-9.6	-16.3	-10.9	-14.9	-12.2	-9.5	-10.8	-12.8	-16.5

Notes: SIRI = severe injection-related infections; IE = infective endocarditis; SSTI = skin and soft tissue infections; MOUD = medications for opioid use disorder
For population estimates in this table, these estimates are per 10,000 PEH who inject opioids.

eTable 54. Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of overdose											
Outcomes	**Atlanta**	**Baltimore**	**Boston**	**Chicago**	**Dallas**	**Denver**	**Detroit**	**Houston**	**Los Angeles**	**Memphis**	**Miami**
Overdose mortality per 10,000	2.8	6.5	2.8	5.3	4.2	8.4	4.8	1.9	2.3	2.3	9813.0
SIRI mortality per 10,000	20.0	24.6	43.7	24.3	21.1	23.3	24.9	21.6	25.6	20.3	16580.0
Proportion of IE deaths from number of IE cases per 10,000	-1.0	-0.7	1.1	0.4	-0.3	-1.3	-0.4	0.6	-0.3	-1.3	0.7
Proportion of SSTI deaths from number of SSTI cases per 10,000	-0.1	0.0	-4.1	-2.0	-2.4	-0.3	-3.3	-3.0	0.3	-3.8	0.2
SIRI cases per 10,000	19.9	24.6	43.5	23.9	21.5	23.5	25.8	21.8	24.3	21.6	52390.0
Number of people hospitalized per 10,000	9.4	12.1	17.6	12.5	13.7	12.7	16.5	13.2	13.4	12.4	23260.0
Number of MOUD initiations per 10,000	-41.0	-28.6	-31.5	-31.3	-39.2	-35.3	-34.9	-43.0	-35.8	-41.6	50461.0
Average number of total overdoses per person	3.4	5.4	2.5	5.2	4.8	6.7	6.1	1.9	4.2	1.6	0.9
Average number of nonfatal overdoses per person	3.5	5.3	2.5	5.1	4.9	6.5	6.2	1.9	4.4	1.5	3.0
Average number of cases of endocarditis per person	22.7	25.8	53.7	26.9	24.7	26.1	28.9	25.7	29.4	24.9	26.3
Average number of severe SSTI per person	19.2	24.0	40.3	22.6	20.6	22.8	25.0	20.8	22.7	20.4	21.3
Average years lived per person	-2.4	-2.9	-5.2	-2.9	-2.1	-2.3	-2.0	-1.7	-2.4	-2.1	-2.9

eTable 54 (continued). Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of overdose

Outcomes	Nassau	New Orleans	New York City	Newark	Philadelphia	Portland	San Diego	San Francisco	San Juan	Seattle	Virginia Beach	Washington D.C.
Overdose mortality per 10,000	5.5	3.1	5.7	4.3	2.2	5.5	5.2	5.9	2.0	3.8	3.4	5.9
SIRI mortality per 10,000	25.7	21.5	24.8	24.4	18.7	21.8	23.0	26.5	22.8	20.7	22.0	26.2
Proportion of IE deaths from number of IE cases per 10,000	-0.6	0.5	0.7	-1.0	0.8	-0.6	0.4	0.8	-0.2	0.6	0.7	0.1
% Mortality SSTI	-1.4	-1.7	-2.7	-3.2	-2.5	-1.2	-4.7	-2.5	-0.8	-2.2	-3.9	0.3
SIRI cases per 10,000	25.1	21.3	24.4	25.0	18.5	21.5	23.7	26.7	22.5	19.7	22.7	24.0
Number of people hospitalized per 10,000	11.7	10.1	10.9	15.5	10.7	8.9	13.1	14.1	13.8	9.3	12.1	14.4
Number of MOUD initiations per 10,000	-33.8	-40.2	-24.3	-34.5	-31.4	-35.6	-36.3	-35.4	-39.8	-35.6	-40.6	-33.2
Average number of total overdoses per person	4.6	3.7	4.3	4.4	2.5	4.9	4.8	5.8	2.9	4.4	3.7	7.3
Average number of nonfatal overdoses per person	4.6	3.8	4.1	4.4	2.5	4.8	4.7	5.8	3.0	4.5	4.2	7.5
Average number of cases of endocarditis per person	29.1	22.6	29.4	27.3	18.7	24.4	26.4	28.7	24.4	22.5	23.6	29.6
Average number of severe SSTI per person	23.7	20.4	22.6	23.6	18.3	19.9	22.4	25.6	21.8	18.1	22.3	22.5
Average years lived per person	-2.7	-3.3	-2.5	-3.0	-2.4	-2.6	-2.0	-2.3	-1.9	-2.0	-2.6	-1.5

Notes: SIRI = severe injection-related infections; IE = infective endocarditis; SSTI = skin and soft tissue infections; MOUD = medications for opioid use disorder
For population estimates in this table, these estimates are per 10,000 PEH who inject opioids.

eTable 55. Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with upper bounds of the confidence interval for MOUD initiation, and lower bounds of the confidence interval for overdose and needle sharing											
Outcomes	**Atlanta**	**Baltimore**	**Boston**	**Chicago**	**Dallas**	**Denver**	**Detroit**	**Houston**	**Los Angeles**	**Memphis**	**Miami**
Overdose mortality per 10,000	40.2	36.1	33.4	37.1	39.2	43.9	40.3	36.6	35.2	31.9	36.0
SIRI mortality per 10,000	-2.7	1.0	24.2	1.3	-0.5	-1.6	-0.2	1.4	0.7	-1.6	0.3
Proportion of IE deaths from number of IE cases per 10,000	-0.4	-0.7	0.1	0.7	-0.4	-3.6	0.0	1.5	-1.5	0.2	1.4
Proportion of SSTI deaths from number of SSTI cases per 10,000	-2.6	-1.0	-2.1	-2.2	-3.0	-3.3	-3.9	-3.4	-2.4	0.2	-1.5
SIRI cases per 10,000	-1.1	2.4	24.2	1.8	1.6	1.8	2.3	2.3	2.5	-0.8	0.8
Number of people hospitalized per 10,000	13.6	14.8	21.1	16.0	12.1	17.8	13.6	11.1	15.1	8.1	12.1
Number of MOUD initiations per 10,000	-13.8	-9.2	-12.2	-9.8	-12.0	-11.9	-10.7	-13.4	-10.7	-12.3	-12.7
Average number of total overdoses per person	40.5	36.4	33.8	35.9	39.1	42.8	40.5	37.9	36.5	32.5	34.3
Average number of nonfatal overdoses per person	40.6	36.5	33.9	35.8	39.2	42.6	40.5	38.1	36.7	32.5	34.1
Average number of cases of endocarditis per person	0.0	0.8	30.7	2.4	0.7	1.6	1.0	3.3	3.6	-3.6	0.0
Average number of severe SSTI per person	-1.4	3.1	22.2	1.6	1.9	1.8	2.6	2.0	2.2	0.1	1.1
Average years lived per person	-4.7	-3.4	-6.3	-3.5	-3.3	-4.0	-3.3	-2.8	-2.9	-2.6	-3.9

eTable 55 (continued). Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of overdose

Outcomes	Nassau	New Orleans	New York City	Newark	Philadelphia	Portland	San Diego	San Francisco	San Juan	Seattle	Virginia Beach	Washington D.C.
Overdose mortality per 10,000	36.3	33.1	42.4	36.0	34.6	37.8	43.2	16.8	37.6	31.4	35.3	40.6
SIRI mortality per 10,000	1.3	0.6	0.9	2.0	-1.0	2.3	-0.7	6.3	-0.1	-1.7	0.8	0.3
Proportion of IE deaths from number of IE cases per 10,000	-2.2	-0.1	-1.1	0.0	0.4	-0.3	-0.9	0.7	1.4	0.2	0.6	-0.3
% Mortality SSTI	1.4	-2.8	-3.9	-4.2	-2.3	-1.2	-3.9	-0.8	-1.4	-1.1	-1.2	-0.6
SIRI cases per 10,000	2.1	1.4	3.4	3.0	-0.5	2.7	1.2	6.4	0.1	-2.1	1.6	0.2
Number of people hospitalized per 10,000	13.8	15.1	18.2	13.1	10.9	19.5	13.7	10.6	8.1	12.6	11.7	13.3
Number of MOUD initiations per 10,000	-11.7	-13.5	-8.7	-10.2	-11.6	-11.6	-12.4	-9.5	-11.8	-10.7	-13.1	-12.1
Average number of total overdoses per person	36.1	33.6	39.5	36.5	33.4	36.8	42.0	16.5	39.4	33.0	34.7	41.2
Average number of nonfatal overdoses per person	36.1	33.7	39.2	36.5	33.2	36.6	41.9	16.5	39.7	33.1	34.6	41.3
Average number of cases of endocarditis per person	1.2	2.3	3.6	3.7	-1.0	3.5	2.2	6.3	-0.9	-0.9	-0.1	1.7
Average number of severe SSTI per person	2.4	0.7	3.4	2.4	-0.1	2.2	0.7	6.4	0.4	-2.7	2.4	-0.1
Average years lived per person	-4.3	-4.3	-3.8	-2.9	-4.5	-3.4	-4.2	-1.5	-2.8	-2.7	-3.9	-4.4

Notes: SIRI = severe injection-related infections; IE = infective endocarditis; SSTI = skin and soft tissue infections; MOUD = medications for opioid use disorder
For population estimates in this table, these estimates are per 10,000 PEH who inject opioids.

eTable 56. Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with lower bounds of the confidence interval for MOUD initiation, and upper bounds of the confidence interval for overdose and needle sharing											
Outcomes	**Atlanta**	**Baltimore**	**Boston**	**Chicago**	**Dallas**	**Denver**	**Detroit**	**Houston**	**Los Angeles**	**Memphis**	**Miami**
Overdose mortality per 10,000	124.0	126.7	116.1	121.6	130.8	131.6	131.3	128.5	120.6	116.9	117.2
SIRI mortality per 10,000	-35.4	-11.0	11.6	-2.7	-19.0	-29.2	-18.0	-6.5	-2.2	-6.5	-12.1
Proportion of IE deaths from number of IE cases per 10,000	-0.4	-0.7	-0.3	0.0	-0.5	-2.2	-0.3	0.4	-1.5	-0.8	1.3
Proportion of SSTI deaths from number of SSTI cases per 10,000	-27.8	-24.3	-20.9	-20.0	-24.5	-27.6	-25.2	-18.8	-15.3	-15.0	-19.0
SIRI cases per 10,000	-17.2	0.3	22.8	5.3	-5.1	-10.2	-3.3	3.6	7.3	1.4	-1.5
Number of people hospitalized per 10,000	55.4	60.2	62.3	63.8	47.9	65.5	52.0	48.2	57.0	38.2	51.7
Number of MOUD initiations per 10,000	-103.6	-80.9	-82.9	-83.2	-96.3	-94.3	-92.6	-93.4	-85.0	-94.9	-96.5
Average number of total overdoses per person	124.6	126.8	115.9	121.1	131.2	131.2	131.3	129.2	120.8	116.2	116.7
Average number of nonfatal overdoses per person	124.7	126.9	115.9	121.0	131.3	131.1	131.3	129.3	120.8	116.1	116.7
Average number of cases of endocarditis per person	-20.8	-1.1	28.3	7.3	-7.6	-13.9	-7.5	3.2	6.7	-0.1	-1.9
Average number of severe SSTI per person	-16.3	0.9	21.1	4.4	-4.4	-9.3	-2.2	3.7	7.5	1.9	-1.3
Average years lived per person	-40.8	-33.9	-34.6	-31.5	-33.5	-37.4	-35.7	-24.0	-25.2	-26.8	-32.3

eTable 56 (continued). Percent difference in 10-year (2019-2028) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city, with no change in the probability of overdose

Outcomes	Nassau	New Orleans	New York City	Newark	Philadelphia	Portland	San Diego	San Francisco	San Juan	Seattle	Virginia Beach	Washington D.C.
Overdose mortality per 10,000	115.9	114.7	123.7	122.7	113.5	122.3	127.2	104.5	130.5	119.3	117.7	126.4
SIRI mortality per 10,000	-9.8	-15.2	-3.1	6.3	-20.1	-2.4	-22.5	12.9	-1.7	-4.8	-11.3	-33.0
Proportion of IE deaths from number of IE cases per 10,000	-2.6	-1.0	-1.3	0.1	-0.2	-1.4	-1.7	0.9	1.4	-0.6	-1.2	-5.2
% Mortality SSTI	-19.7	-22.0	-21.3	-18.1	-19.4	-22.8	-24.5	-12.9	-15.4	-16.8	-19.7	-27.1
SIRI cases per 10,000	1.6	-6.6	8.3	12.3	-14.1	6.9	-10.3	18.2	4.3	1.2	-2.6	-13.9
Number of people hospitalized per 10,000	53.3	60.6	66.6	54.9	43.8	67.6	50.4	56.4	41.7	58.9	45.0	52.2
Number of MOUD initiations per 10,000	-87.0	-99.9	-70.6	-83.0	-89.3	-86.2	-95.8	-81.2	-92.0	-85.8	-94.9	-95.4
Average number of total overdoses per person	116.5	115.1	122.7	122.7	112.9	121.6	126.9	104.7	131.0	119.2	117.1	126.8
Average number of nonfatal overdoses per person	116.5	115.1	122.6	122.7	112.9	121.6	126.8	104.7	131.1	119.2	117.1	126.8
Average number of cases of endocarditis per person	-1.1	-7.4	8.7	11.5	-17.0	7.1	-13.1	18.8	3.6	0.7	-3.4	-22.0
Average number of severe SSTI per person	2.4	-6.0	8.1	12.8	-11.8	6.8	-9.0	17.9	4.6	1.4	-2.2	-11.9
Average years lived per person	-31.4	-37.5	-27.6	-26.0	-38.8	-27.7	-36.4	-21.5	-26.8	-26.5	-30.6	-40.4

Notes: SIRI = severe injection-related infections; IE = infective endocarditis; SSTI = skin and soft tissue infections; MOUD = medications for opioid use disorder
For population estimates in this table, these estimates are per 10,000 PEH who inject opioids.

eTable 57. Percent difference in 5-year (2019-2023) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city											
Outcomes	**Atlanta**	**Baltimore**	**Boston**	**Chicago**	**Dallas**	**Denver**	**Detroit**	**Houston**	**Los Angeles**	**Memphis**	**Miami**
Overdose mortality per 10,000	92.4	89.0	83.2	86.7	94.4	96.0	97.9	90.2	83.6	83.4	83.8
SIRI mortality per 10,000	2.7	11.3	30.0	13.4	8.1	8.0	16.8	9.4	11.7	8.7	6.7
Proportion of IE deaths from number of IE cases per 10,000	-0.73	0.19	-2.7	0.1	0.8	0.6	-0.4	-2.1	-0.3	-0.9	-1.7
Proportion of SSTI deaths from number of SSTI cases per 10,000	-11.0	-7.1	-10.1	-4.1	-7.1	-8.0	-7.9	-2.0	-5.3	-6.9	-8.3
SIRI cases per 10,000	10.1	13.2	35.3	15.1	10.7	13.0	13.1	10.9	14.2	11.4	12.4
Number of people hospitalized per 10,000	47.6	46.0	50.7	47.6	37.5	52.4	40.6	35.0	42.1	30.9	42.6
Number of MOUD initiations per 10,000	-49.6	-35.1	-37.0	-37.9	-45.7	-42.6	-42.4	-46.4	-40.8	-46.4	-46.1
Average number of total overdoses per person	93.7	87.7	81.8	85.7	93.8	96.7	95.0	90.5	84.6	81.6	83.4
Average number of nonfatal overdoses per person	93.8	87.5	81.6	85.6	93.7	96.8	94.6	90.5	84.8	81.3	83.3
Average number of cases of endocarditis per person	9.7	16.0	41.7	15.2	13.0	12.3	14.3	12.6	16.5	13.9	11.6
Average number of severe SSTI per person	10.2	12.0	33.5	15.1	10.1	13.1	12.8	10.4	13.6	10.6	12.7
Average years lived per person	-10.8	-9.7	-11.0	-9.3	-8.6	-9.5	-9.4	-6.1	-7.0	-8.1	-9.3

eTable 57 (continued). Percent difference in 5-year (2019-2023) modeled outcomes from the "no displacement" strategy to the "continual involuntary displacement" strategy, by city												
Outcomes	**Nassau**	**New Orleans**	**New York City**	**Newark**	**Philadelphia**	**Portland**	**San Diego**	**San Francisco**	**San Juan**	**Seattle**	**Virginia Beach**	**Washington D.C.**
Overdose mortality per 10,000	86.4	83.3	86.0	85.7	81.1	86.0	93.2	75.3	91.6	85.3	83.8	94.9
SIRI mortality per 10,000	10.6	5.1	12.2	15.8	3.1	8.2	5.1	76.1	15.2	10.8	10.6	7.9
Proportion of IE deaths from number of IE cases per 10,000	2.2	0.4	0.2	0.9	-0.6	-0.7	-0.1	33.2	-0.3	-0.2	-1.8	2.4
% Mortality SSTI	-8.6	-7.0	-7.0	-2.8	-3.5	-9.4	-11.8	69.3	-6.1	-5.5	-6.2	-7.4
SIRI cases per 10,000	13.0	7.4	14.6	15.8	4.3	12.4	9.4	7.8	16.6	12.0	13.2	11.0
Number of people hospitalized per 10,000	41.6	46.5	49.2	39.9	33.9	54.2	40.2	36.9	33.4	44.8	37.5	42.5
Number of MOUD initiations per 10,000	-41.0	-47.3	-30.3	-40.1	-40.2	-40.9	-43.4	-37.2	-43.5	-41.2	59.9	-42.8
Average number of total overdoses per person	84.1	82.9	86.2	85.4	81.0	85.7	93.5	89.3	93.6	84.1	83.2	94.6
Average number of nonfatal overdoses per person	83.9	82.8	86.2	85.4	81.0	85.7	93.5	91.0	93.9	84.0	83.1	94.5
Average number of cases of endocarditis per person	14.0	7.2	18.2	16.3	4.2	12.3	11.2	64.7	20.0	13.3	15.4	9.6
Average number of severe SSTI per person	12.7	7.6	10.0	15.5	4.4	12.5	8.6	-12.8	15.3	11.2	12.2	11.4
Average years lived per person	-9.3	-11.3	-8.1	-7.6	-11.9	-8.0	-9.3	-13.2	-6.6	-7.7	-9.4	-10.7

Notes: SIRI = severe injection-related infections; IE = infective endocarditis; SSTI = skin and soft tissue infections; MOUD = medications for opioid use disorder
For population estimates in this table, these estimates are per 10,000 PEH who inject opioids.

eFigure 1. Differences in 10-year modeled clinical outcomes between "no displacement" and "continual involuntary displacement" strategies, by city. a) overdose mortality per 10,000 people; b) SIRI mortality per 10,000 people; c) proportion of IE deaths from total IE cases; d) proportion of SSTI deaths from total SSTI cases; e) total number of SIRI cases per 10,000 people; f) number of people hospitalized per 10,000; g) MOUD initiations per 10,000 people; h) average number of total overdoses per person; i) average number of nonfatal overdoses per person; j) average number of cases of IE per person; k) average number of SSTI cases per person; l) average years lived per person. This series of 12 bar graphs outlines the absolute differences in the clinical outcomes between the "no displacement" and "continual involuntary displacement" strategies for each city. On the X axis are the 23 cities. On the Y axis are the percentage or numerical values for each outcome. The black bars represent the "no displacement" strategy and the gray bars represent the "continual involuntary displacement" strategy.

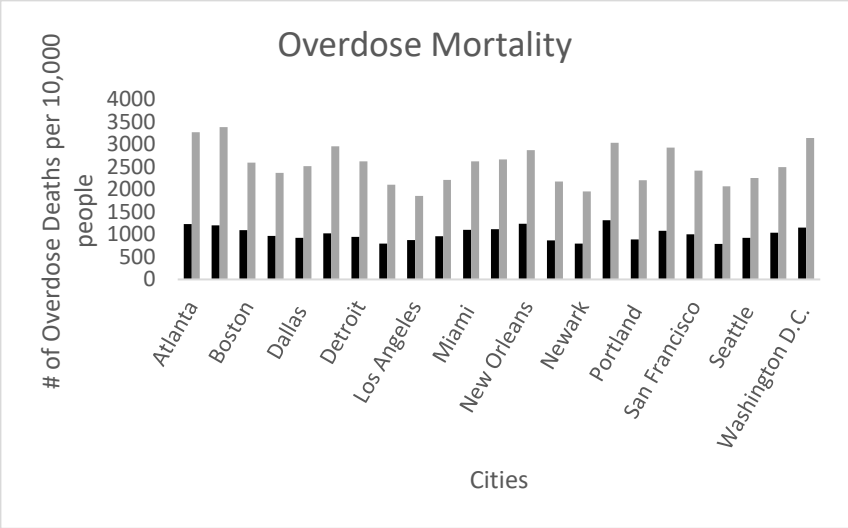


Figure 1a. Overdose Mortality per 10,000

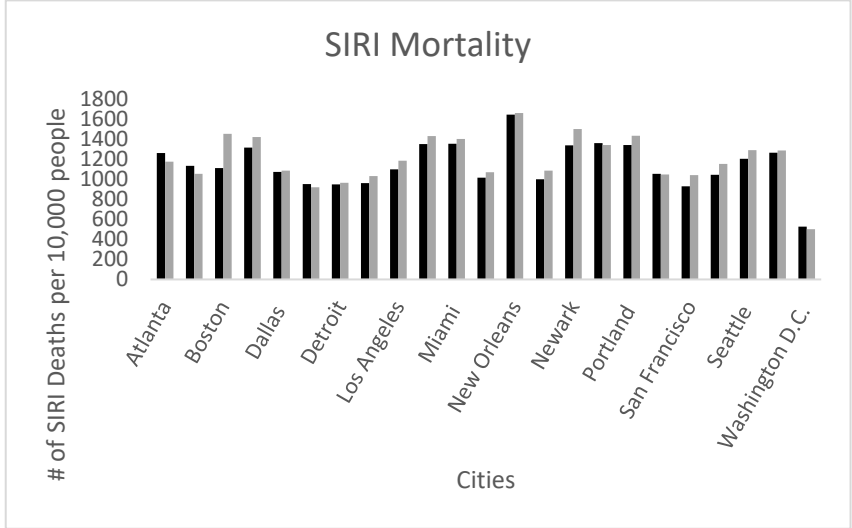


Figure 1b. SIRI mortality per 10,000

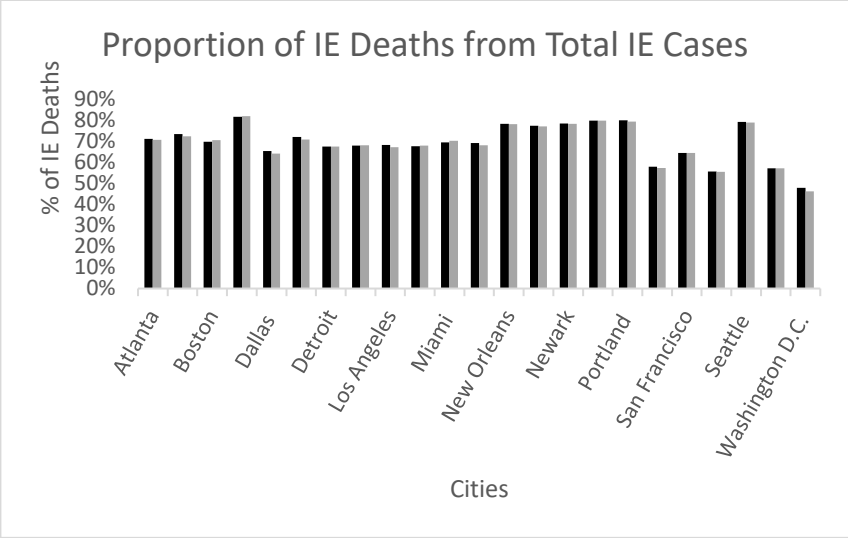


Figure 1c. Proportion of IE deaths from number of IE cases per 10,000

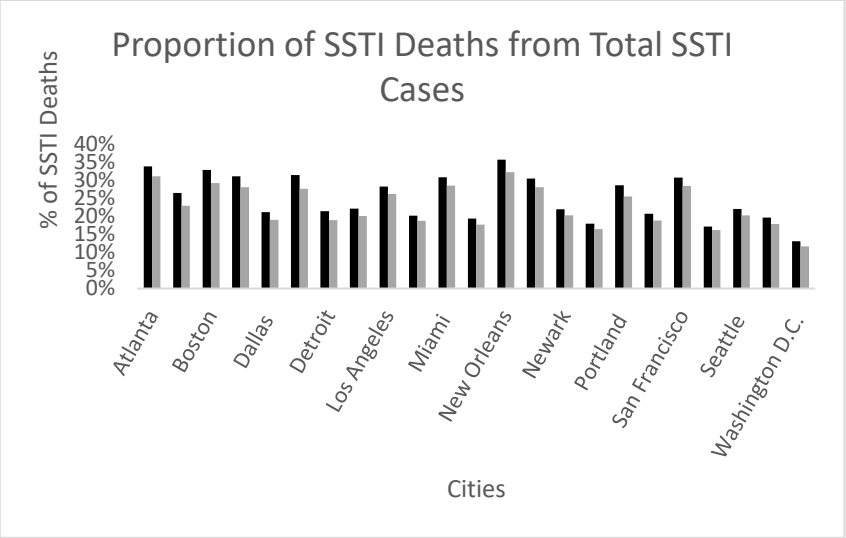


Figure 1d. Proportion of SSTI deaths from number of SSTI cases per 10,000

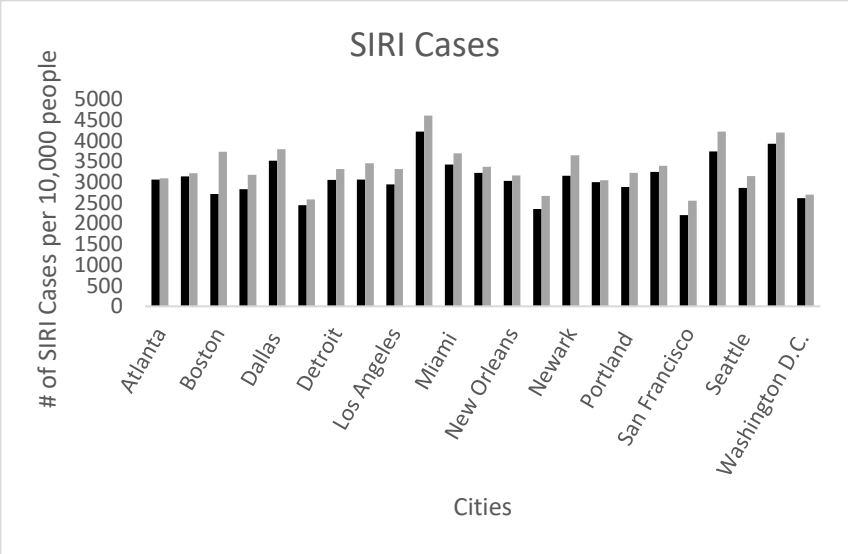


Figure 1e. SIRI cases per 10,000

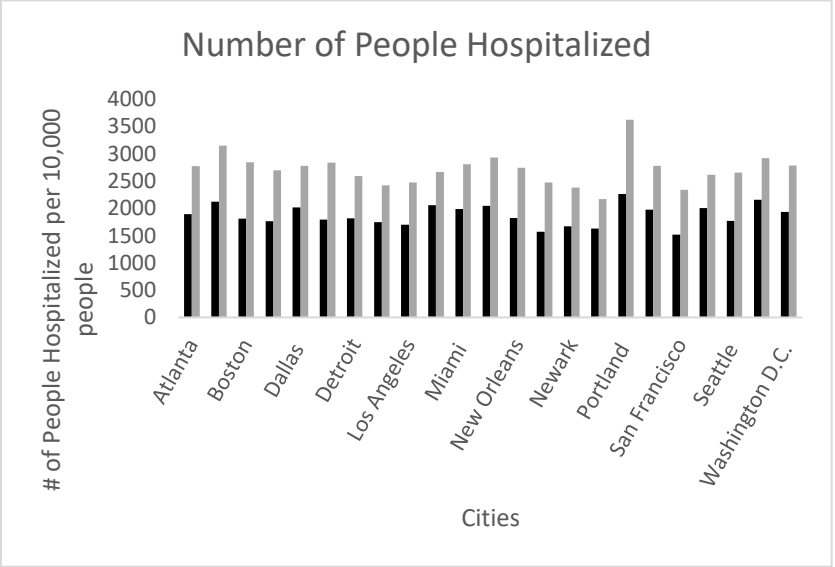


Figure 1f. Number of people hospitalized per 10,000

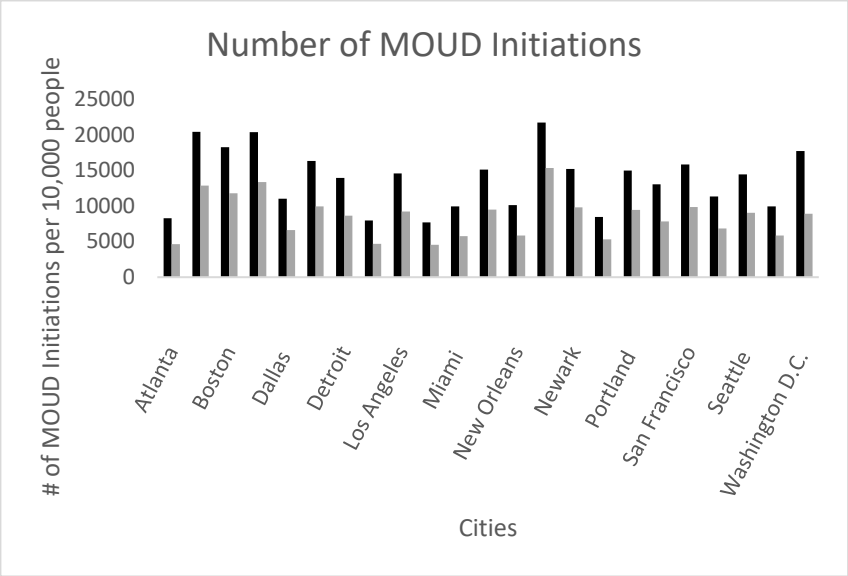


Figure 1g. Number of MOUD initiations per 10,000

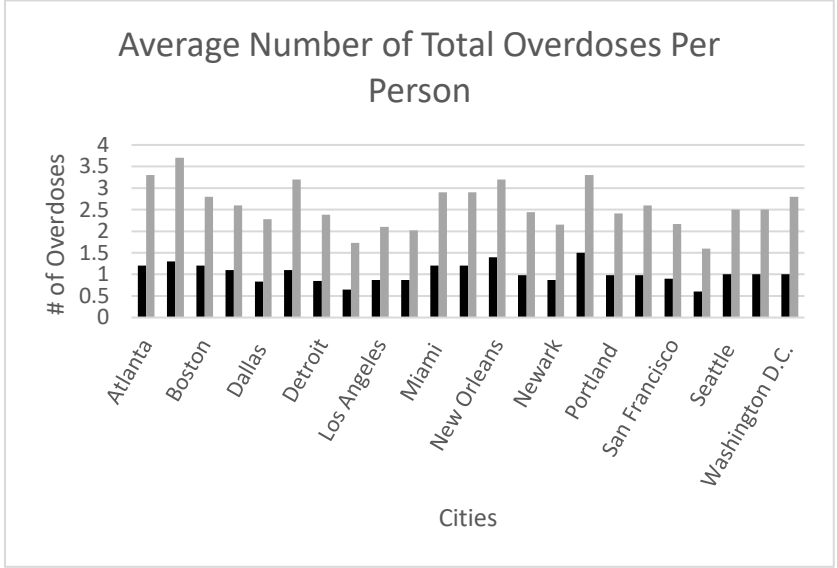


Figure 1h. Average number of total overdoses per person

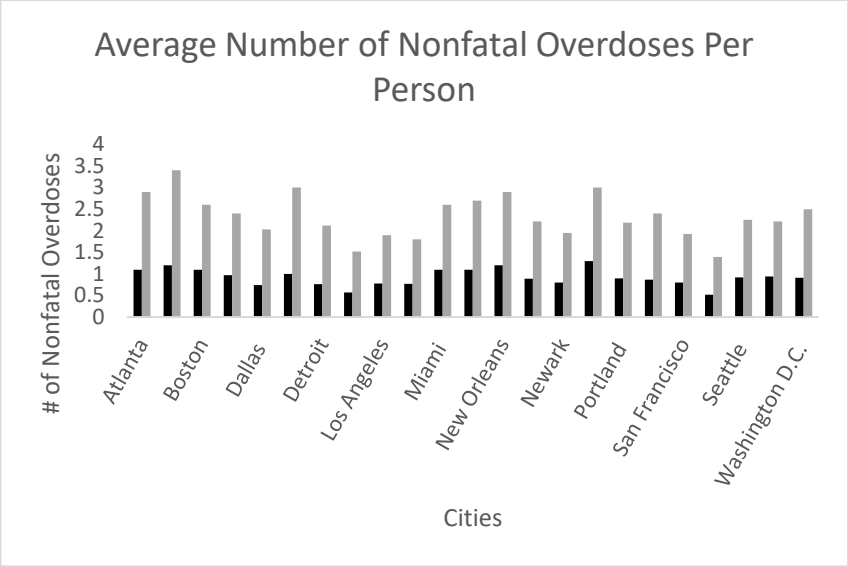


Figure 1i. Average number of nonfatal overdoses per person

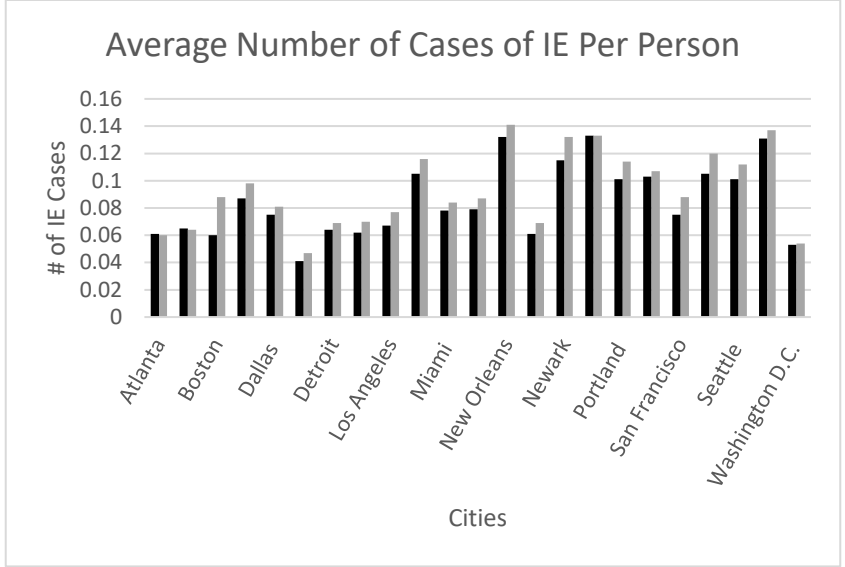


Figure 1j. Average number of cases of IE per person

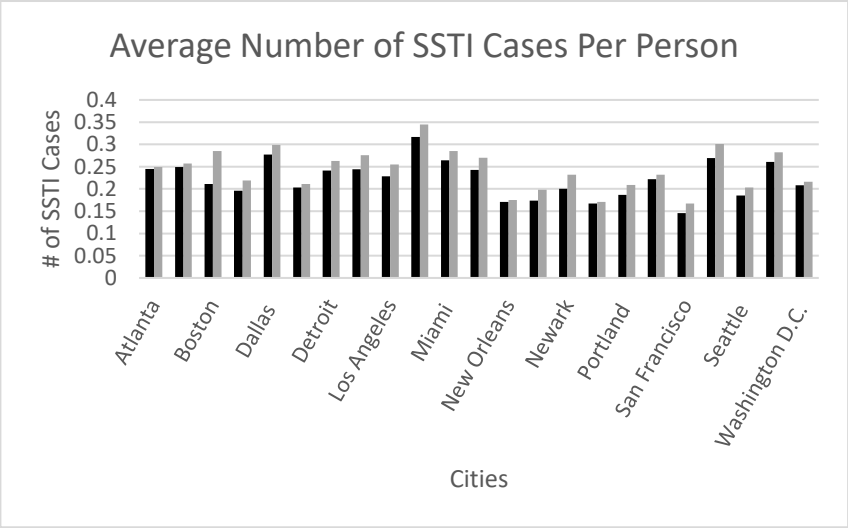


Figure 1k. Average number of severe SSTI per person

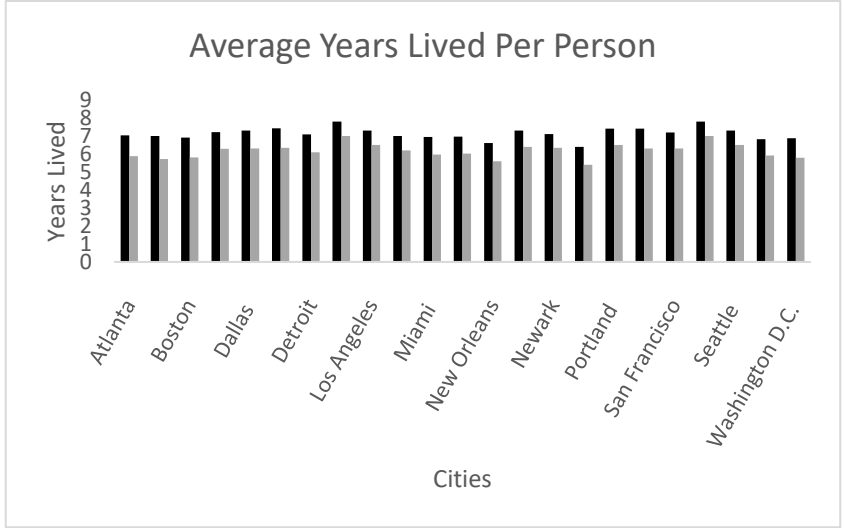
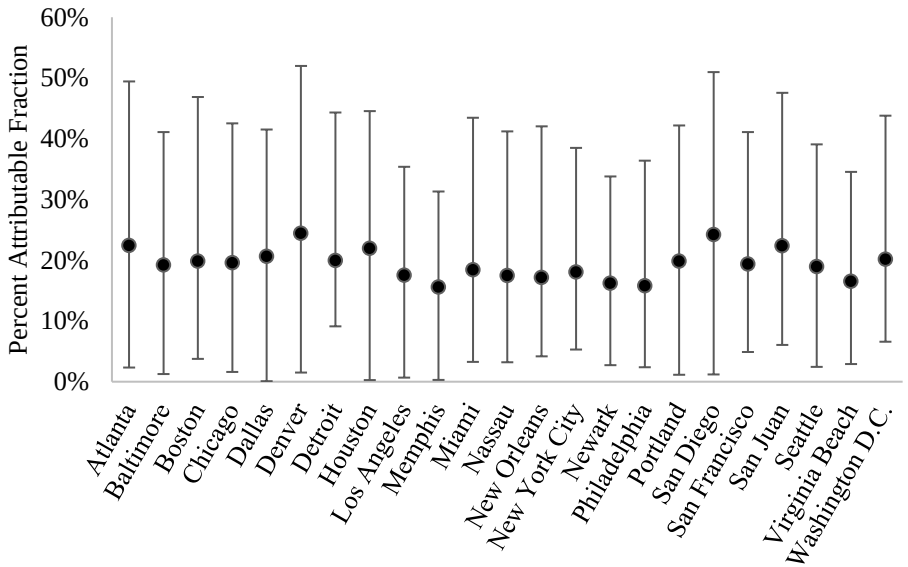
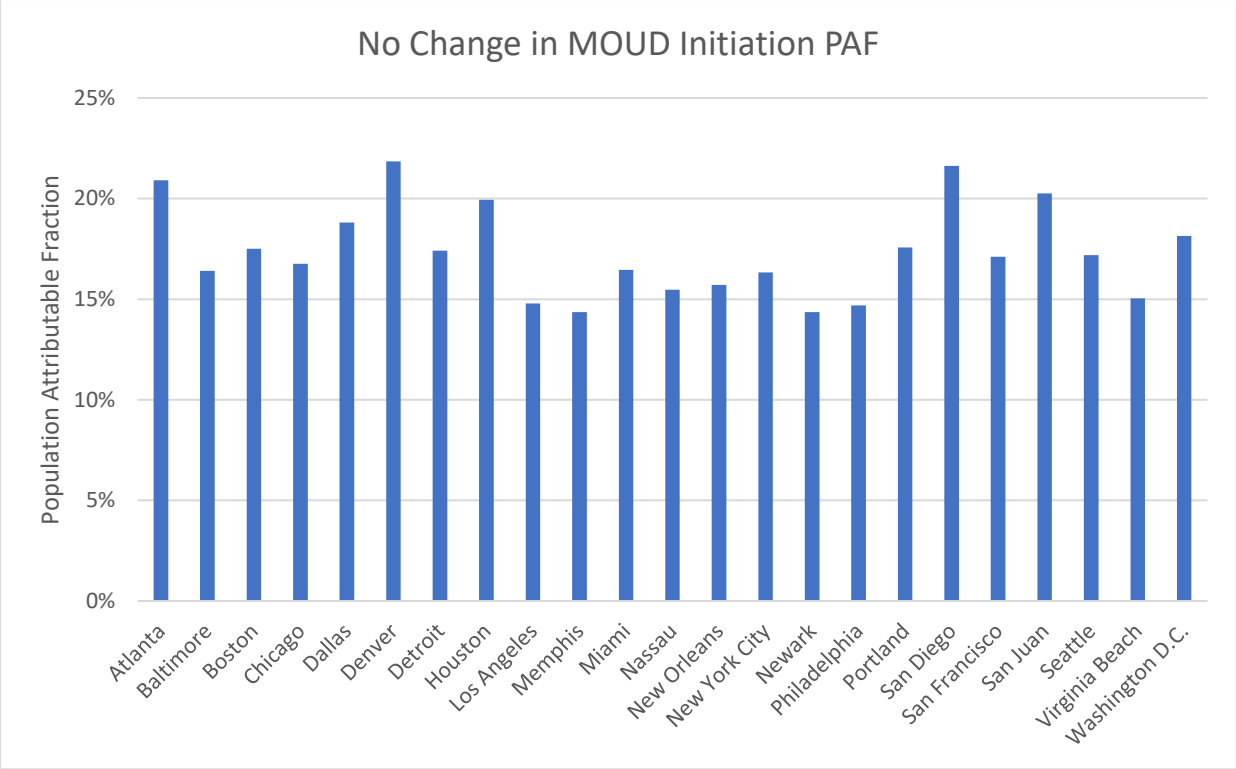


Figure 1l. Average years lived per person

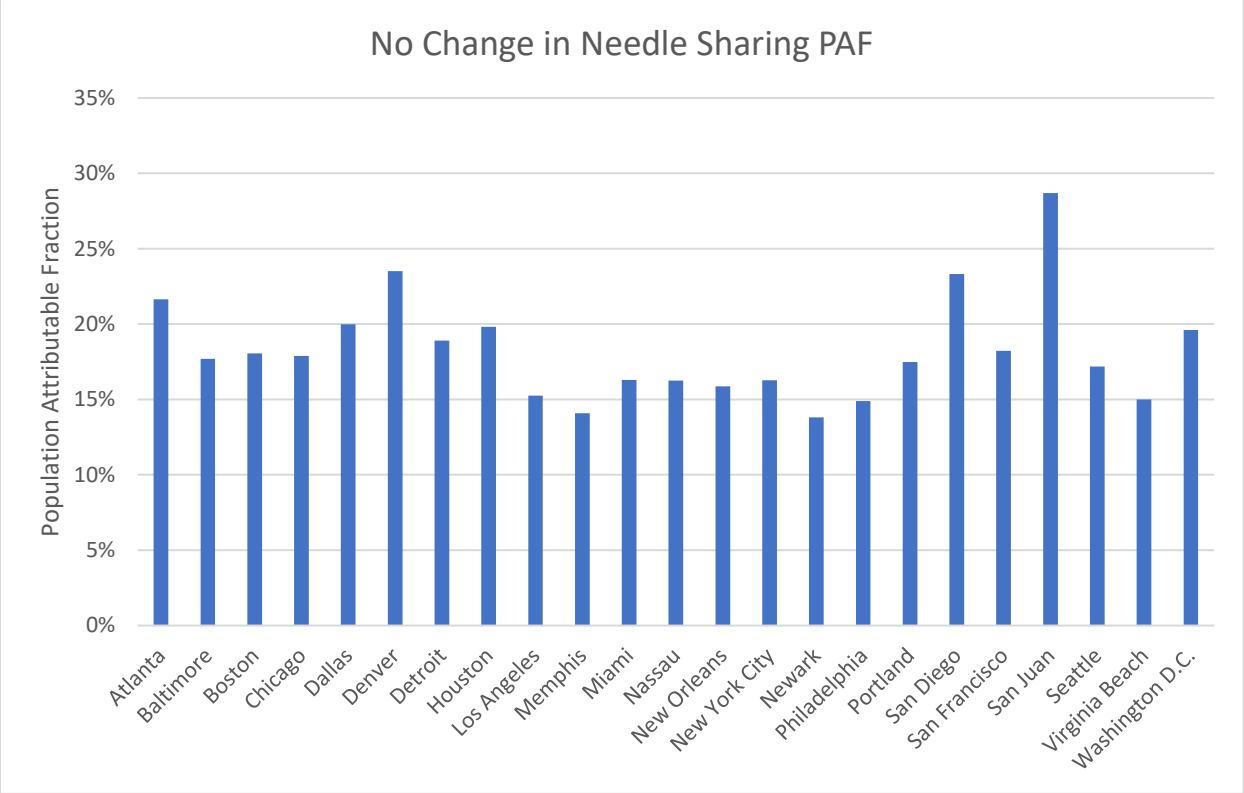
eFigure 2. City-specific 10-year PAFs of continual displacement on all-cause mortality among PEH who inject drugs. Bars are 99.5% credible intervals. PAF= population attributable fraction. To estimate the potential contribution of continual displacement to mortality, the base case (no displacement) model fits for each city were run for 10 years from 2019 to 2028, with each being compared with the counterfactual model scenario over that period. The population attributable fraction (PAF) of displacement was calculated by comparing the number of deaths from all causes occurring over 10 years as: $PAF = 100 - 100 \times \frac{deaths\ in\ base\ case}{deaths\ in\ counterfactual}$. Note, "Nassau" is "Nassau County, NY."



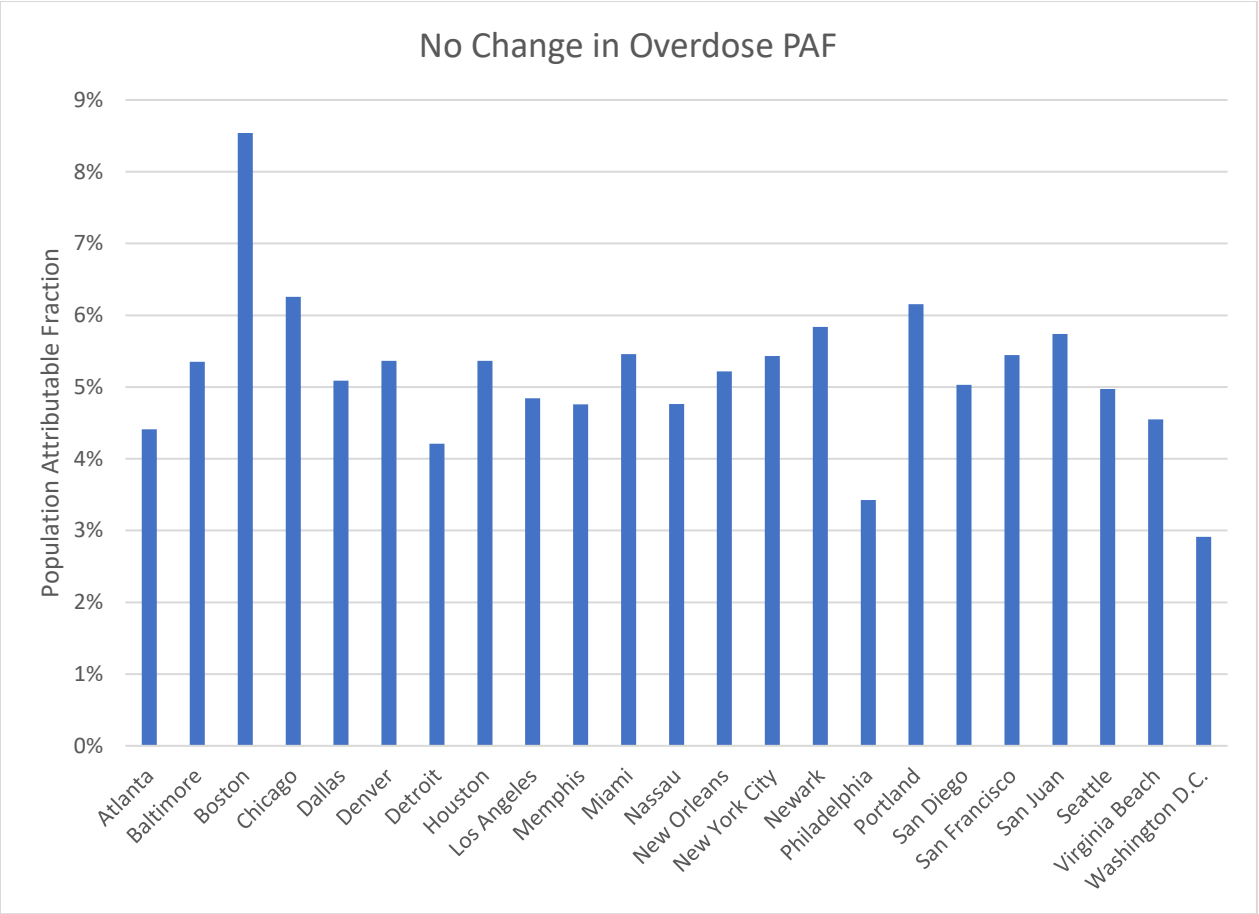
eFigure 3. **City-specific 10-year PAFs of continual displacement on all-cause mortality among PEH who inject drugs assuming no change in MOUD initiation with displacement.**



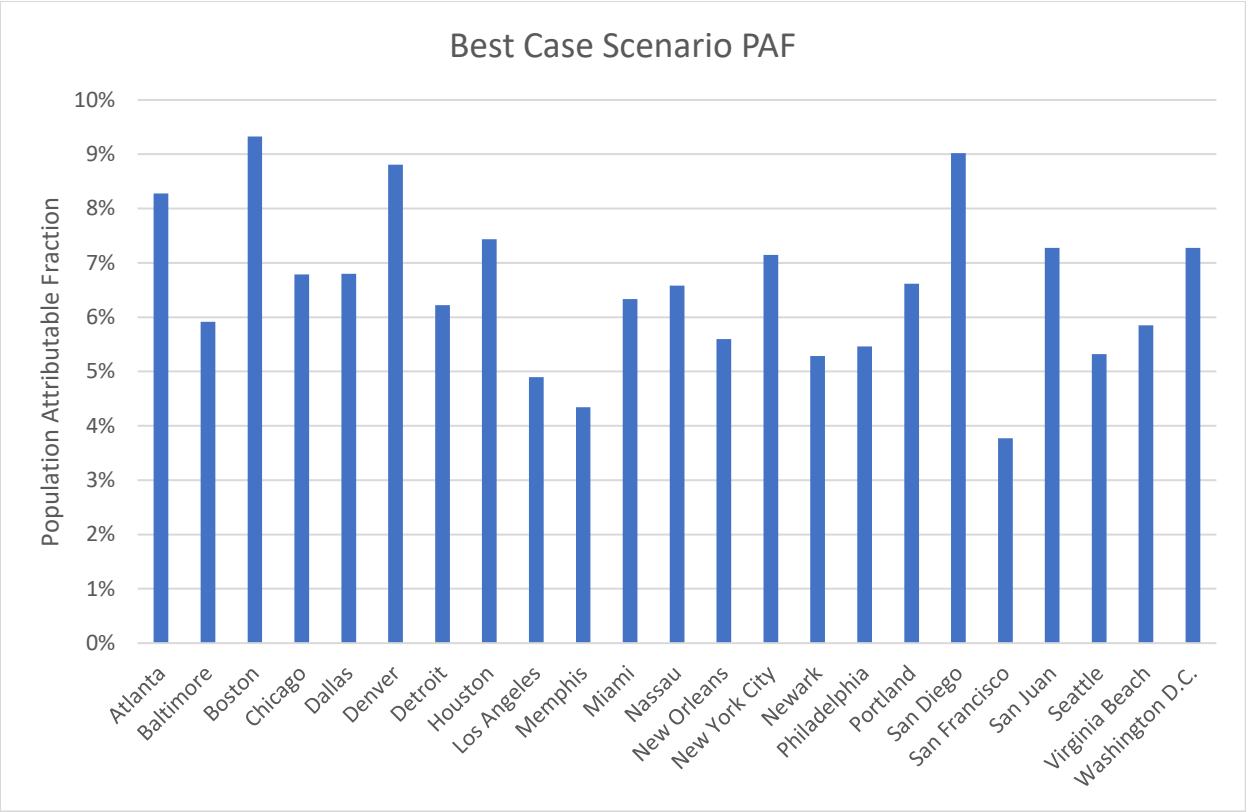
eFigure 4. **City-specific 10-year PAFs of continual displacement on all-cause mortality among PEH who inject drugs assuming no change in needle/syringe sharing with displacment**



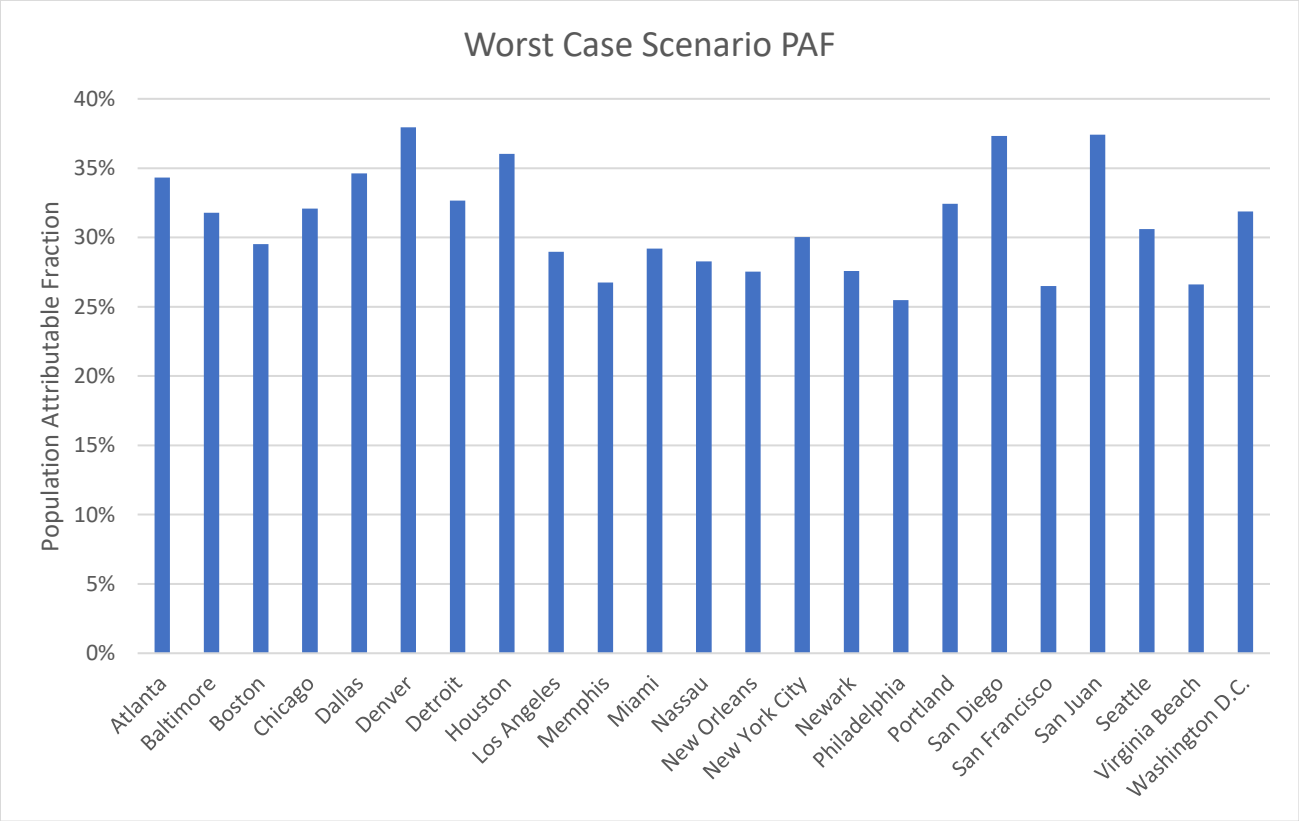
eFigure 5. **City-specific 10-year PAFs of continual displacement on all-cause mortality among PEH who inject drugs assuming no change in overdose risk with displacement**



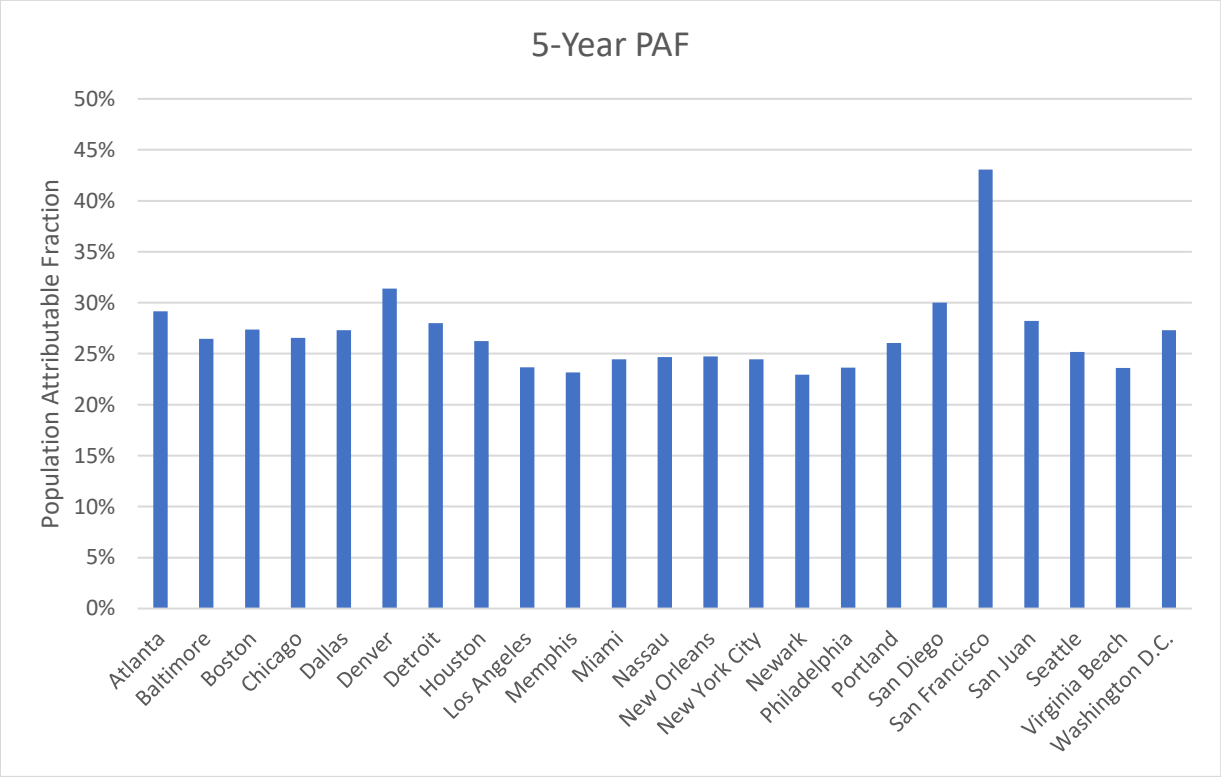
eFigure 6. **City-specific 10-year PAFs of continual displacement on all-cause mortality among PEH who inject drugs assuming best case scenario with displacement**



eFigure 7. **City-specific 10-year PAFs of continual displacement on all-cause mortality among PEH who inject drugs assuming worst case scenario**



eFigure 8. **City-specific 5-year PAFs of continual displacement on all-cause mortality among PEH who inject drugs.**



eTable 58. Reporting checklist

Element	Journal Article	Supplement
Introduction		
Background of the problem	√	
Study Design and Scope		
Objectives	√	
Audience	√	
Type of analysis	√	
Target population	√	
Description of intervention and comparators	√	
Other intervention descriptors	√	
Boundaries of the analysis; defining the scope or comprehensiveness of the study	√	
Time horizon	√	
Analytic perspectives	√	
Whether this analysis meets the requirements of the reference case	√	
Analysis plan	√	
Methods and data		
If model based analysis:		
Description of event pathway or model	√	
Model diagram	√	
Description of the model used	√	
Modeling assumptions		√
Software used		√
Identification of key outcomes	√	
Complete information on sources of effectiveness data, cost data, and preference weights	√	
Methods for obtaining estimates of effectiveness (including approaches used for evidence synthesis)	√	√
Methods for obtaining estimates of costs and preference weights	N/A	N/A
Critique of data quality	√	√
Statement of costing year	N/A	
Statement of methods used to adjust for inflation	N/A	
Statement of currency used	N/A	
Source of expert judgment (if applicable)	√	
Statement of discount rates	N/A	
Impact Inventory		
Full accounting of consequences within and outside the health care sector	√	
Results		
Results of model validation		√
Reference case results: total costs and effectiveness, incremental costs and effectiveness, ICERs, uncertainty measures	√	√
Disaggregated results for important categories of costs, outcomes or both	√	√
Results of sensitivity analysis	√	√
Other estimates of uncertainty	√	√
Graphical representation of cost-effectiveness results	N/A	N/A
Graphical representation of uncertainty analyses	√	√
Aggregate cost and effectiveness information	√	
Secondary analyses	√	√
Disclosures		
Statement of any potential conflicts of interest due to funding source, collaborations, or outside interests	√	
Discussion		
Summary of reference case results	√	
Discussion of the study results in the context of results of related cost-effectiveness analyses	N/A	

Discussion of ethical implications	√	
Limitations of the study	√	
Relevance of study results to specific policy questions or decisions	√	
Summary of sensitivity of results to assumptions and uncertainties in the analysis	√	

Reporting checklist included on recommendation from the Second Panel on Cost-Effectiveness in Health and Medicine

eTable 59. Consolidated Health Economic Evaluation Reporting Standards (CHEERS) Checklist

Item	Item	Recommendation	Section
Title and Abstract			
Title	1	Identify the study as an economic evaluation	Title
Abstract	2	Provide a structured summary of objectives, perspective, setting, methods, results, and conclusions	Abstract
Introduction			
Background and objectives	3	Provide an explicit statement of the broader context for the study	Introduction
Methods			
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analyzed, including why they were chosen	Introduction
Setting and location	5	State relevant aspects of the system in which decisions need to be made	Methods: Overview
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated	Methods: Overview
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen	Methods: Overview
Time horizon	8	State the time horizons over which costs and consequences are being evaluated	Methods: Overview
Discount rate	9	Report/explain the choice of discount rate used for costs and outcomes	Methods: Overview
Choice of health outcomes	10	Describe what outcomes were used as the measure of benefit in the evaluation and their relevance for the analysis	Methods: Overview
Measurement of effectiveness	11	Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data	Methods: Overview
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes	Methods: Overview
Estimating resources and costs	13	Describe approaches and data sources used to estimate resource use associated with model health states	Supplement
Currency, price date and conversion	14	Report the dates of the estimated resource quantities and unit costs	Methods: Overview
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used	Methods: Model Description; Supplement
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model	Methods: Model Description; Supplement
Analytical methods	17	Describe all analytical methods supporting the evaluation	Methods: Model Description; Supplement
Results			
Study parameters	18	Report the values, ranges, references, and probability distributions for all parameters	Table 1
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between comparator groups	Tables 2
Characterizing uncertainty	20	Describe the effects on the results of uncertainty for all input parameters and uncertainty related to the structure of the model and assumptions	Results: Sensitivity Analysis; Supplement
Characterizing heterogeneity	21	If applicable, report differences in costs, outcomes, or cost-effectiveness that can be explained by variations between subgroups of patients	Results: Sensitivity Analysis; Supplement

Discussion			
Findings, limitations, generalizability, and current knowledge	22	Summarize key findings and describe how they support the conclusions reached, and limitations to generalizability	Discussion
Other			
Source of funding	23	Describe study funding and other non-monetary sources of support	Methods: Role of the Funding Source
Conflicts of interest	24	Describe any potential conflicts of interest	Author Funding/Conflict Statements

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